Eagle 2000

Ultra-compact 2 kW FM R.F. Amplifier
User's Manual

Revision 1.0

Quark BROADCASTING SRL Via Copernico 2 – 20019 Settimo Milanese (MI) - Italy
Tel. +39 02 023288410 – email info@quarkelectronics.it – www.quarkelectronics.it

Preliminary notes

We used the utmost care in making a complete manual with detailed, accurate and updated information, yet the contents herein cannot be regarded as totally binding towards our company.

Quark, in their constant commitment to improve the quality of their products, reserve the right to vary the technical features of the same without prior notice. For a full update please visit our web-site www.quarkelectronics.it or contact our local dealer or agent.

The manufacturer will not be held responsible for any consequence caused by errors or improper handling on which he has no direct control.

According to the requirements of our customers, the described options may vary from model to model.

All rights reserved. No part of this document can be reproduced in any form or by any means, including recording or photocopy without Quark's prior written authorization.

Via Copernico, 2
20019 Settimo Milanese (MI) Italy

Ph. +0039-02-023288410
e-mail: info@quarkelectronics.it
Web site: www.quarkelectronics.it

Quark Broadcasting S.r.l. hereby declares that the object of this manual complies with the requirements specified in the 1999/05/EC directive.

CE 0678 !

Contents

1 INTRODUCTION 5

2 GENERAL INFORMATION 6
2.1 Safety suggestions 6
2.1.a General safety recommendations 6
2.1.b Good practices 7
2.1.c First aid in case of electrical shock 7
2.1.d Emergency resuscitation technique 7
2.1.e Treatment for burns 8
2.2 Symbols used in this document 9

3 WARNINGS 10
3.1 Safety first! 10

4 PARTS DESCRIPTION 11
4.1 Front view 11
4.2 Control panel 11
4.3 Rear view 12
4.4 Internal top view - main parts location 13

5 CIRCUITS DESCRIPTION 14
5.1 Power supply unit 14
5.1.a Power supply unit connections and indications 14
5.1.b Main power supply switch and power supply relay 15
5.2 R.F. amplifier section 15
5.2.a Connections of the R.F. amplifier section 15
5.3 Control (CPU) board 16
5.3.a Control board connections and commands 16
5.4 Analog board 17
5.4.a Adjustment of the maximum output Power level 17
5.4.b Adjustment of direct and reflected power levels readings 17
5.4.c Analog board connections 17
5.5 Fans control board 18
5.5.a Fans control board connections 18
5.6 LCD display and control panel board 18
5.7 Digital encoder (multifunction knob) 19

6 INSTALLATION 20
6.1 Checking the supplied parts 20
6.2 General safety rules 20
6.3 Placing the equipment 20
6.3.a Choosing the proper room and location 20
6.3.b Environmental Conditions 20
6.3.c Electrical conditions 21
6.4 Connecting the equipment 21
6.4.a Connecting the antenna 21
6.4.b Connecting the AC power line 21
6.4.c Connecting to the exciter 22

7 BASIC OPERATIONS 23
7.1 Turning on/turning off 23
7.1.a First switching on (during installation) 23
7.1.b Adjusting the output power 23
7.1.c Setting the display language 24
7.1.d Setting date and time 24
7.1.e Turning off 26

8 USE OF THE MENUS 27
8.1 Use of the multifunction knob 27
8.2 Navigating the menu 27
8.3 Confirming/quitting the settings 28

9 MENU DESCRIPTION 29
9.1 Startup page 29
9.2 Working Page 29
9.3 Main menu 29
9.4 Set Power Output menu 30
9.5 Debug Page menu 30
9.5.a Analog Inputs menu 30
9.5.b Logic Inputs menu 31
9.5.c Encoder Test menu 32
9.6 Language menu 32
9.7 Set Function, Size menu 32
9.8 Set LCD Contrast menu 32
9.9 Set Clock menu 33
9.10 Info Page menu 33

10 SET FUNCTION, SIZE MENU 34
10.1 Program page menu 34
10.1.a Function menu 35
10.1.b Power size menu 35
10.1.c Show Timers menu 36
10.1.d Set power saver menu 36
10.1.e Set a new password menu 37

11 MAINTENANCE AND WARRANTY 39
11.1 Maintenance 39
11.1.a Clogging by dust 39
11.1.b Cooling fans 39
11.1.c Periodic overhaul 39
11.2 Warranty 39

12 TROUBLESHOOTING AND ALARMS 40
12.1 Types of alarms and relevant LEDs information 40
12.2 Alarm messages 41

13 TECHNICAL FEATURES 42

14 INDEX 43

15 ELECTRICAL, MECHANICAL DIAGRAMS AND PARTS LOCATION 45

16 DECLARATION OF CONFORMITY 66

1 INTRODUCTION

Congratulations for your choice! **Eagle 2000** is new-concept, FM broadcasting solid state (MOS-FET), wide-band 2.000 W amplifier. The system is so compact it can be entirely fitted into a 19" 2 unit rack 500 mm depth, which makes Eagle 2000 the ideal solution for medium power repeaters in unattended stations, in N+1 systems and also as a spare amplifier. These are only some of the state-of-the-art features that make the Eagle 2000 a truly unique device:

- **Ultra compact size and reduced weight (15 kg).**
- **Thoroughly modular construction.** The R.F. amplifier is composed of 3 ultra-compact new-generation internal modules. Such modules are easy to identify and inspect.
- **High reliability.** Thanks to the internal balance circuits, in case one of the three internal modules fails, the other modules left are automatically re-balanced, thus to continuing the operation at reduced power.
- **Better reliability.** The rated output power (2000W) is reached at the 80% of the maximum output power the equipment can generate (2400W).
- **Low operation costs.** The special care taken in the design, aimed at minimizing internal losses, allows a very high electrical efficiency to be achieved thus minimizing power consumption and thereby reducing operation costs.
- **High ventilation and low heat sinking.** The reduced internal losses and high overall efficiency minimize heat sinking. As a result, the size of the internal ventilation system can meet even the most demanding environmental conditions.
- **Large allowable bandwidth and low maintenance requirements**.
- **Interactive control panel with LCD display.** Enables the user to set easily the equipment modes and commands and to display the operation parameters through the practical multifunction knob.
- **Sturdy modular mechanical and electrical construction.** It guarantees a high MTBF and an easy maintenance.
- **High efficiency.** To control the output power level the output power loop control adjusts first the power supply voltage of the MOS FET and, if it's not sufficient, it adjusts the Bias voltage.
- **Continuous control of the cooling fans speed.** This control allows a constant temperature of the amplifier heatsink, and a longer lifespan of the cooling fans.
- **Automatic reset when an active alarm ends.** When an active alarm ends, the equipment is able to automatically reset itself, without the need of human intervention.
- **Simple diagnostics and unambiguous parameters reading.** This is due to a comprehensive metering and alarm section on LCD display. Thanks to the optional external telemetry system (available with the next version of Eagle 2000), parameters and alarms are easily accessible from remote posts through the relevant remote control input.
- **Compliance with the strictest norms.** The equipment was designed in compliance with the tightest international norms, as well as the recent, strict anti-magnetic noise EC requirements. Besides, the equipment complies with the EC and ETSI 302.018-2 v 1.1.2.1 (2006-03) standards.

***Please note** that the manufacturer, in his continuous attempt to improve further the quality of his product, reserves the right to vary its technical features without prior notice.*

Warning! Before carrying out any operation, it is essential to read the whole of the present manual – with particular reference to Chapters 2 and 3 – in order to avoid damages to objects and people.

2 GENERAL INFORMATION

2.1 Safety suggestions

Regardless of how well electrical equipment is designed, personnel can be exposed to dangerous electrical shock when protective covers are removed for maintenance or other activities. Therefore, the user is obliged to see that all safety regulations are consistently observed and that each individual assigned to the equipment has a clear understanding of the first aid related to electrical shocks (see following pages).

IN ADDITION THESE SAFETY PRACTICES MUST BE FOLLOWED:

- Do not attempt to adjust unprotected circuit controls or to dress leads with power on.
- Always avoid placing parts of the body in series between ground and circuit points.
- To avoid burns, do not touch heavily loaded or overheated components without precautions.
- Remember that some semiconductor cases and solid-state circuits carry high voltages.
- Do not assume that all dangers of electrical shock are removed when the power is off. Charged capacitors can retain dangerous voltages for a long time after power is turned off. These capacitors should be discharged through a suitable resistor before any circuit points are touched.
- Don't take chances. Be fully trained. Quark Broadcasting equipments should be operated and maintained by fully qualified personnel.
- Do not service alone and do not perform internal adjustments of these units unless another person capable of rendering first aid and resuscitation is present.
- Some components used in the construction of this equipment contain Beryllium Oxide (BeO). This substance is harmless as it is, but becomes highly dangerous if it's ground to powder. Special procedures of disposal must be observed in case of failure of these devices.

> **Note: This section is not intended to contain a complete statement of all safety precautions which should be observed by personnel in using this electronic equipment or others.**
>
> Quark Broadcasting SHALL NOT BE responsible for injury or damage resulted from improper procedures or from using it by improperly trained or inexperienced personnel.

2.1.a General safety recommendations

When connecting the equipment to the power, please follow these important recommendations:

- These products are intended to operate from a power source that will not apply more than 10% of the voltage specified on technical specifications between the supply conductors or between either supply conductor and ground. A protective-ground connection by way of the grounding conductor in the power cord is essential for safe operation.
- This equipment is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired socket before connecting to the product input or output terminals.
- Upon loss of the protective-ground connection, all accessible conductive parts (including parts that may appear to be insulating) can render an electric shock.
- To avoid fire hazard, use only fuses of correct type, voltage rating, and current rating. Refer fuse replacement to qualified service personnel.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

2.1.b Good practices

In maintaining the equipment covered in this manual, please keep in mind the following, standard good practices:

- When connecting any instrument (wattmeter, spectrum analyzer, etc.) to a high frequency output, use the appropriate attenuator or dummy load to protect the final amplifiers and the instrument input.
- When inserting or removing printed circuit boards (PCBs), cable connectors, or fuses, always turn off power from the affected portion of the equipment. After power is removed, allow sufficient time for the power supplies to bleed down before reinserting PCBs.
- When troubleshooting, remember that FETs and other metal-oxide semiconductor (MOS) devices may appear defective because of leakage between traces or component leads on the printed circuit board. Clean the printed circuit board and recheck the MOS device before assuming it's defective.
- When replacing MOS devices, follow standard practices to avoid damage caused by static charges and soldering.
- When removing components from PCBs (particularly ICs), use care to avoid damaging PCB traces.

2.1.c First aid in case of electrical shock

If someone seems unable to free himself under electric shock contact, turn the power off before rendering aid. A muscular spasm or unconsciousness can make a victim unable to free himself from the electrical power.

If power cannot be turned off immediately, very carefully loop a length of dry non-conducting material (such as a rope, insulating material, or clothing) around the victim and pull him free of the power. Carefully avoid touching him or his clothing until free of power.

DO NOT TOUCH VICTIM OR HIS CLOTHING BEFORE POWER IS DISCONNECTED

OR YOU CAN BECOME A SHOCK VICTIM YOURSELF

2.1.d Emergency resuscitation technique

Step 1

Check the victim for responsiveness. If there is no response, **immediately call for medical assistance**, and then return to the person**.**

Step 2

Position the person flat on his back. Kneel by his side and place one hand on the forehead and the other under the chin. Tilt the head back and lift the chin until teeth almost touch. Look and listen for breathing.

Step 3

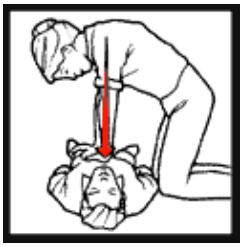
If not breathing normally, pinch the nose and cover the mouth with yours. Give two full breaths. The person's chest will rise if you are giving enough air.

Step 4

Put the fingertips of your hand on the Adam's apple, slide them into the groove next to the windpipe. Feel for a pulse. If you cannot feel a pulse or are unsure, move on to the next step.

Step 5

Position your hands in the center of the chest between the nipples. Place one hand on top of the other.



Step 6

Push down firmly two inches. Push on chest 15 times.

CONTINUE WITH TWO BREATHS AND 15 PUMPS UNTIL HELP ARRIVES

2.1.e Treatment for burns

- Continue treat victim for electrical shock.
- Check for points of entry and exit of current.
- Cover burned surface with a clean dressing.
- Remove all clothing from the injured area, but cut around any clothing that adheres to the skin and leave it in place. Keep the patient covered, except the injured part, since there is a tendency to chill.
- Splint all fractures (violent muscle contractions caused by the electricity may result in fractures).
- Never permit burned surfaces to be in contact with each other, such as: areas between the fingers or toes, the ears and the side of the head, the undersurface of the arm and the chest wall, the folds of the groin, and similar places.
- Transport to a medical facility.

2.2 Symbols used in this document

In order to allow a quick and essential reading, we used symbols which attract immediate attention, and which simply and efficiently advise and inform the user.

The symbol of the open hand, stresses a description of the highest importance, which concerns technical intervention, dangerous situations, security warnings, advice and/or information of the highest importance. If such symbol is not heeded, serious problems/consequences could arise.

The written notebook represents practical and important advice which we recommend to follow in order to obtain the best performance possible from the equipment.

The display messages (menu, options, etc.) are written **`in this font`** `(bold Courier New)`.

Important sentences and words are underlined.

For ease of reference, cross references to sections, chapters, page numbers, diagrams, etc. may be indicated using the ⇨ symbol. For example: "⇨3.1" means "refer to paragraph 3.1"

3 WARNINGS

3.1 Safety first!

Before connecting or using this device, carefully read all instructions contained in this manual, in the order in which they are written. Cross references to sections and chapters were created exclusively for ease of use. Keep this manual in a safe place for future reference.

IMPORTANT: Improper use or installation of this device could cause serious damage to objects and people alike. Therefore, it is essential to rely on an installer who has been previously authorized or approved by Quark Broadcasting, or by our local representative, and that both the user and the installer read the entire manual before carrying out any operation.

All warnings included in this manual must be strictly followed to avoid damages to both the device and the operator. Read and follow all instructions indicated on warning labels or affixed to the device and its accessories.

The equipment weighs about 15 kg and should therefore be moved or carried exclusively with the proper equipment and the due caution.

Do not turn the equipment on without having duly wired and connected it, as explained in chapter 6.

Always follow the laws and regulations stipulated regarding the use of broadcast transmitters, as in effect in the geographical area in which you are operating.

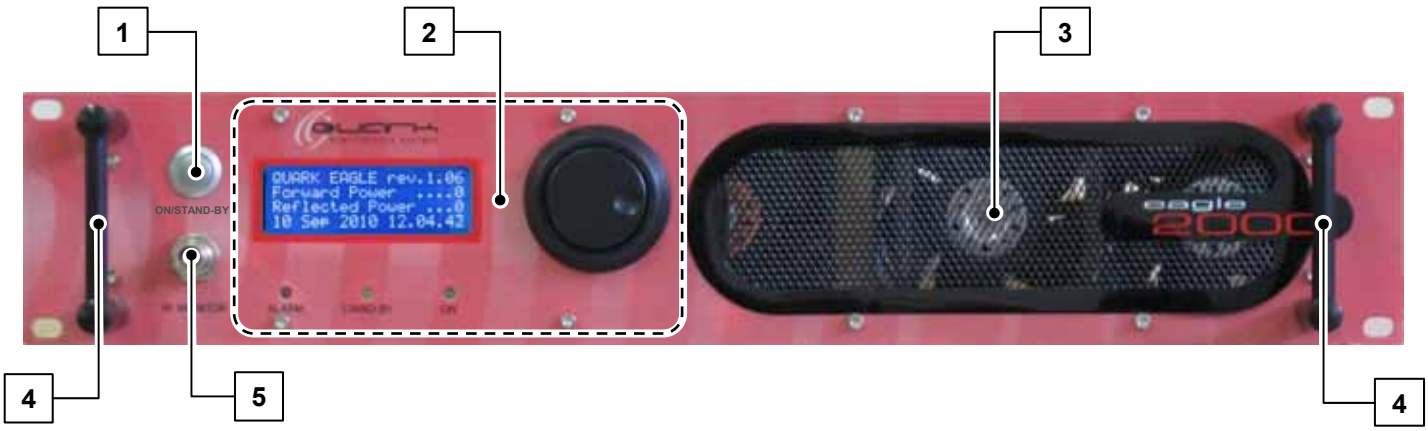
The amplifier output power must be exclusively adjusted through the amplifier menu and NOT through any other way, such as the driving power. If this rule is not followed the equipment could get damaged. In case of specific needs, please contact Quark.

As the equipment software is regularly updated, some of the screenshots or menus described in this manual might be slightly different than those will actually appear on your device. In case of doubts, promptly contact Quark.

4 PARTS DESCRIPTION

4.1 Front view

Please see the following images to spot and identify the equipment parts and gain confidence with them:



[1] **ON/STAND-BY button** – allows switching the equipment between the operating (ON) condition and the stand-by one. To get the command working, keep this button pressed for at least two seconds.

[2] **Control panel** – allows the user to set device functions, and to view and set operating parameters. For further details ⇨4.2.

[3] **Front ventilation grid –** allows the device to draw in the cooling air into the equipment.

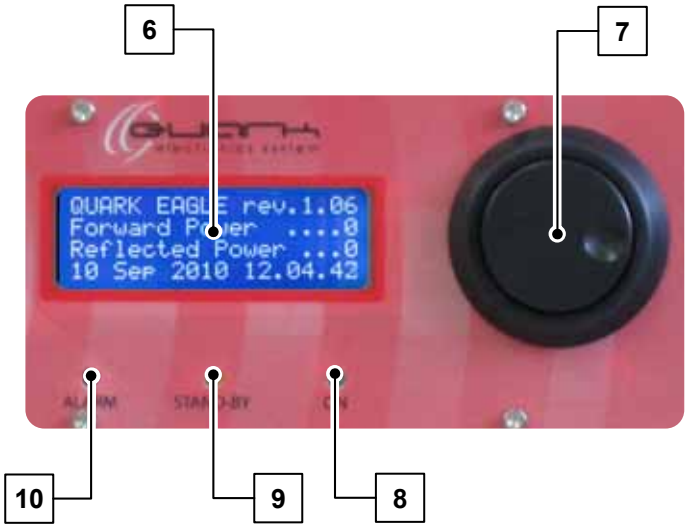
[4] **Front handles** – they allow the user to easily carry the device.

[5] **R.F. monitor output** – BNC-type connector for sourcing the low level RF signal; this function is useful for connecting to external measurement units. The signal attenuation is 50 dB.

RF MONITOR output does not guarantee an output level that is perfectly constant versus frequency. As such, it cannot be used for precision spectrum measurements.

4.2 Control panel

The control panel commands are the followings:



[6] **LCD (Liquid Crystal Display) –** this display, composed of 4 lines of 20 characters, shows the operation parameters and functions selected through the multifunction knob.

[7] **Multifunction knob (digital encoder) –** it allows the user to navigate through the command menu in various ways.

- If turned – selects the various functions/operations for the device, or the parameter values to be set
- If pressed (for a short time like a button) when inside the menu, it activates the currently selected option

For further information regarding the use of the multifunction knob ⇨8.1

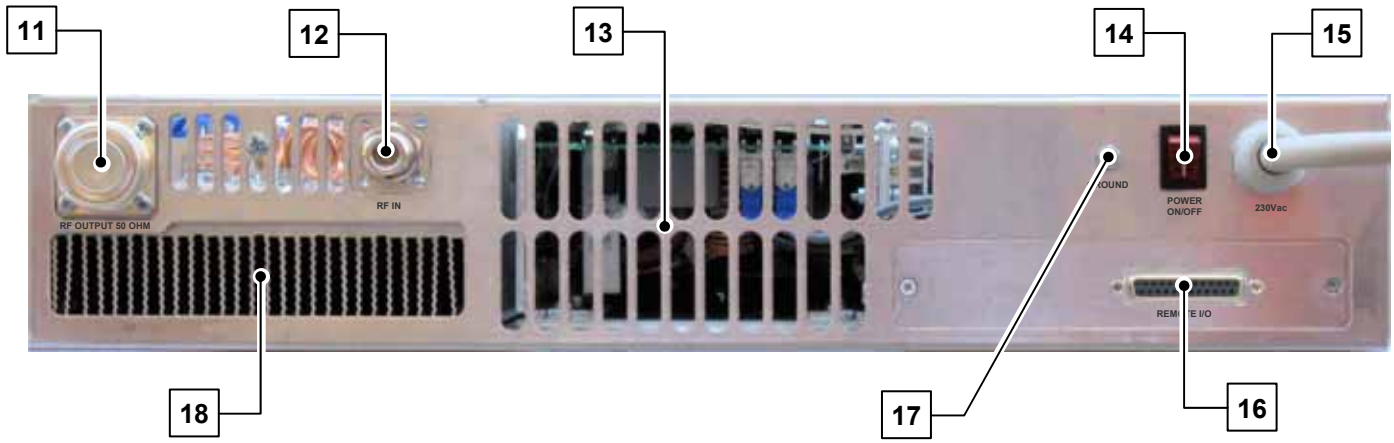
[8] **ON LED** - this LED glows green when the equipment is in normal operation.

[9] **STAND-BY LED** - this LED glows yellow when the equipment is in stand-by mode. In this condition, the amplifier can't temporarily deliver output power until it's reverted back into operation mode through the **ON/STAND-BY** button [1].

[10] **ALARM LED** - this LED glows red if an alarm event occurs.

The combination of these 3 LEDs can also show if an alarm has been issued. For further information please refer to par. 12.1.

4.3 Rear view



[11] **R.F. OUTPUT 50 OHM** – an FM broadcasting suitable antenna able to bear the amplifier rated power must be connected to this 7/16 flange.

Instead of the 7/16 flange, the amplifier can be supplied, on demand, with a 7/8 connector.

[12] **R.F. IN** – a 25 to 30 W rated exciter must be connected to this N-type connector.

The equipment can be supplied with an optional N-N cable to connect the amplifier to the exciter.

[13] **Exhaust cooling air outlet** – the exhaust cooling air which came into the equipment through the front ventilation grid, used to cool the power supply unit, exits from this outlet.

[14] **POWER ON/OFF** – it enables to switch on/off the main power supply.

*After the first switch on, when installing the amplifier, this switch has to be used only for maintenance purposes. The standard way to switch on/off Eagle 2000 is via the **ON/STAND-BY** button [1] located on the front side.*

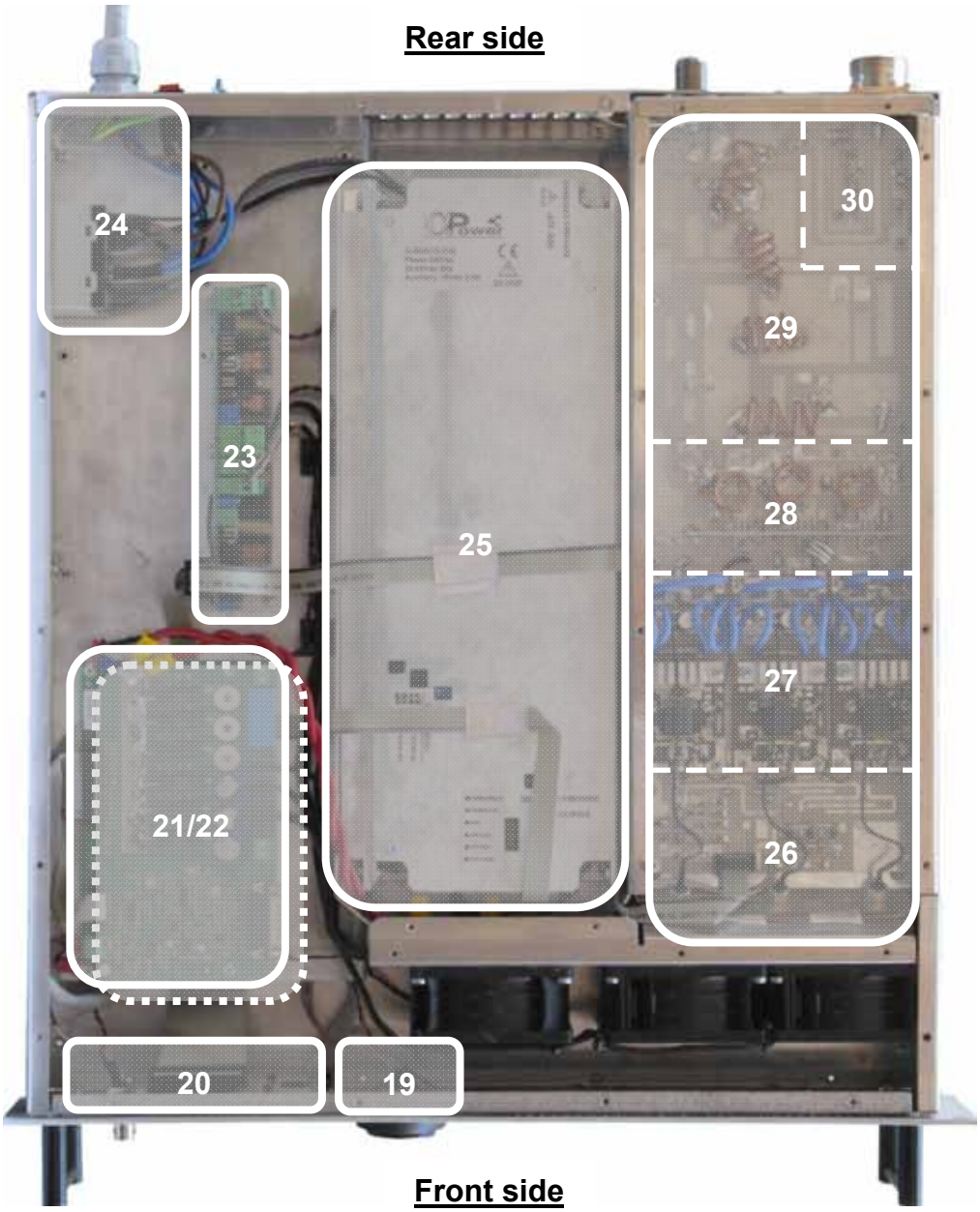
[15] **$230V_{AC}$** – the amplifier comes with a 3 x 2.5 mm^2 - 2 meters length power supply cable.

[16] **REMOTE I/O** – in the next version of Eagle 2000, this DB25 connector will enable the remote control option.

[17] **GROUND** – it allows the connection of the equipment to ground for a safe operation.

[18] **Exhaust air ventilation outlet** – the exhaust cooling air which came into the equipment through the front ventilation grid, used to cool the RF section heatsink, exits from this outlet.

4.4 Internal top view - main parts location



[19] **Digital encoder** – multifunction knob (⇨5.7).
[20] **Display board** (⇨5.6).
[21] **Analog board** (⇨5.4).
[22] **Control (CPU) board** (⇨5.3) - installed underneath the analog board.
[23] **Fans control board** (⇨5.5).
[24] **Main power supply switch and AC power supply relay.**
[25] **Power Supply unit** (⇨5.1).
[26] **Amplifier section / 3-ways Wilkinson splitter.**
[27] **Amplifier section / 800W power modules.**
[28] **Amplifier section / 3-ways Wilkinson combiner.**
[29] **Amplifier section / Low-pass filter.**
[30] **Amplifier section / Directional couplers.**

5 CIRCUITS DESCRIPTION

This section's sole purpose is to provide general explanations about the device operation in order to simplify the maintenance by skilled personnel appointed by Quark. As already mentioned, no internal adjustments are required for normal operation. Tampering with the internal settings makes the warranty null and void. Moreover, could seriously damage the equipment, compromising the guaranteed performance.

Several modules are highly specialized and difficult to repair even by skilled technicians and must therefore be replaced with new modules, and, if possible, sent to the manufacturer in order to verify the possibility of a repair.

Any inspection of the described modules must be carried out with the cover removed and, in many cases, with the equipment connected to the power line. Although some live parts are insulated and difficult to reach, this involves the risk of accidental contact with the power line voltage. In order to avoid this, use only insulated tools and never touch the main power supply switch or the power sockets when the equipment is connected to the power line.

Do not operate the equipment without the covers properly screwed on. If the top cover is removed, malfunctioning of the equipment may occur, as well as of any other electronic measuring instrument, owing to the strong R.F. fields involved.

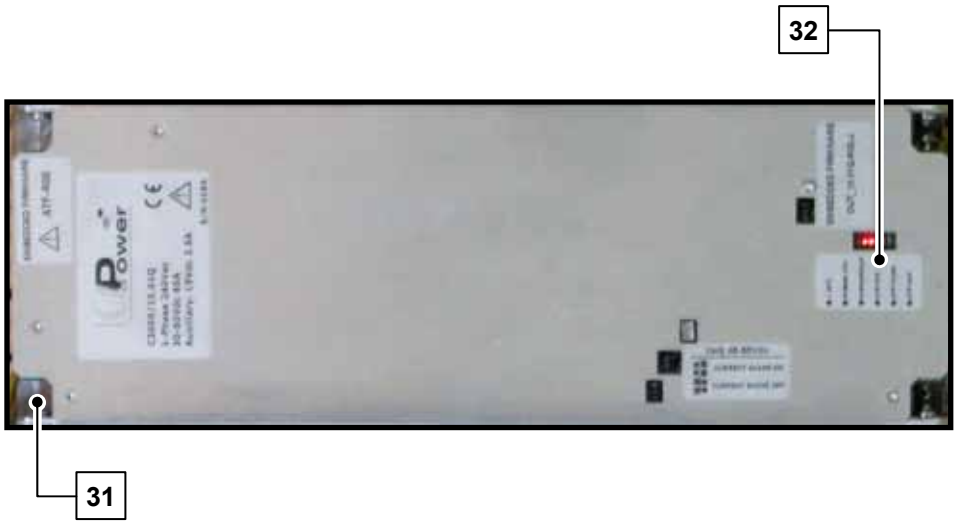
Eagle 2000 is composed of the following elements:

- Power supply unit
- R.F. amplifier section
- Control board
- Analog board
- Fans control board
- LCD display and control panel button board
- Digital encoder

5.1 Power supply unit

The Power supply unit is an **αPower** AC/DC converter (3kW and 48V_{DC} rating) with PFC (power factor correction) with output voltage adjustable from 0 to 30V_{DC}. This supply voltage is adjusted according to a 0-12V command signal sent by the analog board via a flat cable. The unit produces two supply voltages: a 30-48 V_{DC} to supply the R.F. amplifier unit, and a 15V_{DC} to supply the service boards (excluding the control board which is powered by the 48 V_{DC}).

5.1.a Power supply unit connections and indications



[31] **Mains voltage -** coming from the power supply relay.

[32] **Power Supply status LEDs**.

5.1.b Main power supply switch and power supply relay

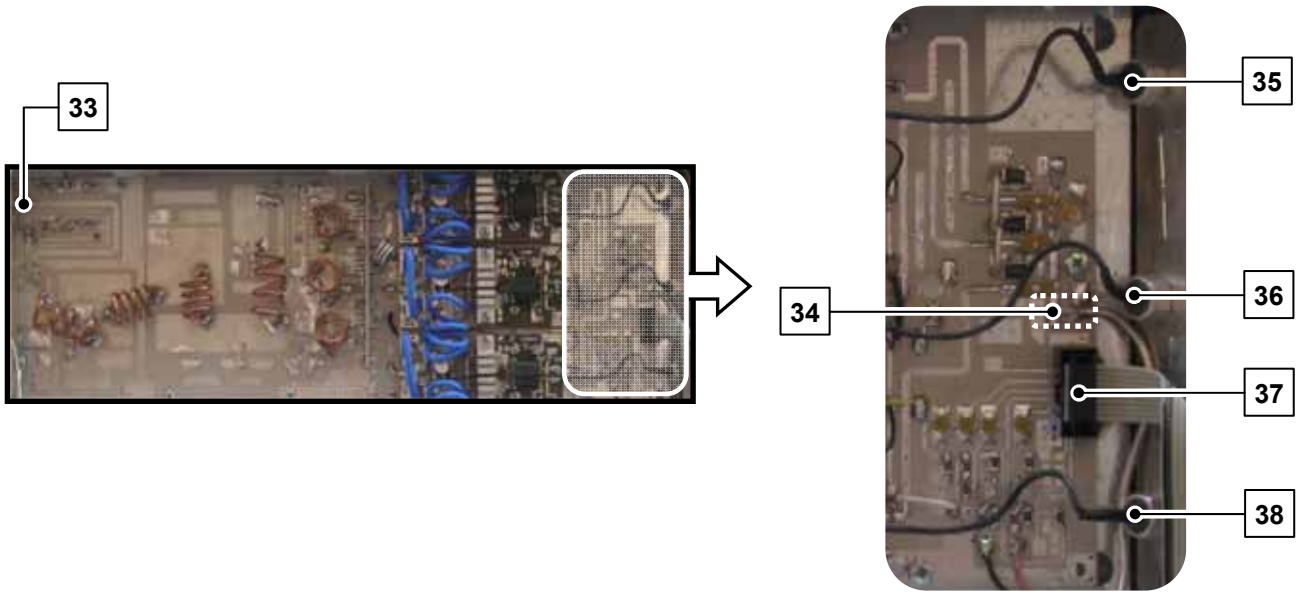
The main power supply switch triggers a power supply relay rated for the supply current required by the equipment. The power supply unit is connected to this relay.

5.2 R.F. amplifier section

The first element of this section is a 3-ways Wilkinson splitter [26] which splits the R.F. input power (30W) into three 10W outputs. These signals are the inputs of three 800W amplifier modules [27]. The outputs of the three amplifier modules are fed to a 3-ways Wilkinson combiner [28] which combines the three signals into one (this circuit includes also three unbalancing and load resistors). The coupler output is connected to a low-pass filter [29], which delivers the signal to the antenna output flange. In this part of the amplifier section also includes the directional couplers [30], which extracts the direct and reflected powers and the low-level R.F. signals (connected to the R.F. Monitor output connector located on the front panel).

- *The RF input signal must be between 25 and 30W. This value doesn't affect the output power level, because the amplifier's output power adjustment isn't obtained by changing the input level (from the exciter), but adjusting the amplifier's section gain by means of the proper menu. This solution which guarantees a constant high efficiency, even when the user decides to set an output power which is lower than the rated one.*
- *Even if Eagle 2000 is able to output a (max) 2400W output power (thanks to the use of the 3x800W amplifier modules), it has a rated output power of 2000W, a solution allowing a better reliability.*

5.2.a Connections of the R.F. amplifier section



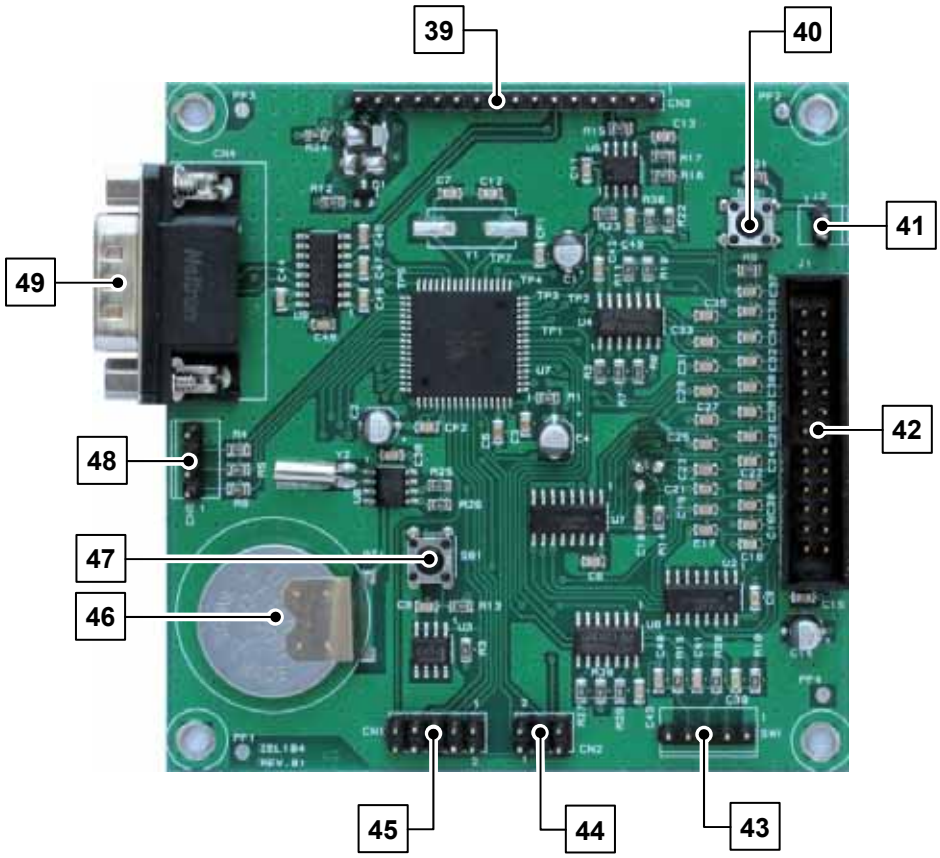
[33] **R.F. output signal**.
[34] **R.F. input signal**.
[35] **48V_{DC} power supply** – for the 800W amplifier module #3.
[36] **48V_{DC} power supply** – for the 800W amplifier module #2.
[37] **Analog data bus** - 10 pole flat cable used to send to the control board the information related to: direct power, reflected power, bias, temperature, input power.
[38] **48V_{DC} power supply** – for the 800W amplifier module #1.

5.3 Control (CPU) board

The control board, located just behind the analog board, stores the software which manages the equipment. Moreover, the built in memory stores the programs used in all models of the Eagle series (please see the bottom note). This board is connected to the various part of the system, thus allowing the CPU to control the equipment operation by sending the appropriate commands or, conversely, to get the data concerning the current functioning and process (e.g. possible alarms). The CPU is also connected to the LCD display board and to the digital encoder.

This control board can be used as "universal" spare part for all the Eagle models because it stores the programs for all of them. If there is an equipment with such board broken, you can easily replace it just by setting the right model with the ***`Set Function,Size`*** *menu (⇨10).*

5.3.a Control board connections and commands



[39] **Data bus with the 4x20 display – 10 pole connector.**
[40] **On/stand-by secondary switch.**
[41] **On/stand-by command** – connection with the ON/STAND-BY button located on the front panel.
[42] **Data bus between the CPU board and the Analog board.**
[43] **Data bus between the CPU and the digital encoder** (multifunction knob on the front panel).
[44] **JTAG for programming purposes.**
[45] Not used.
[46] **Backup battery** – only for the clock circuits.
[47] **CPU reset button.**
[48] **Data bus between the CPU board and the LEDs board.**
[49] **RS232 port** – not active.

5.4 Analog board

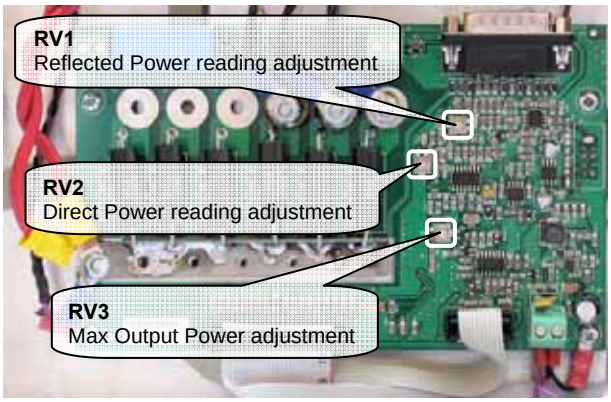
This board manages all the equipment protections via the output power loop control and the reflected power loop control. On the board there are two trimmers to adjust the direct (**RV2**) and reflected (**RV1**) powers shown on the display (e.g. in the working page, ⇨9.2), and a third trimmer (**RV3**) for the adjustment of the maximum output power level (see the following paragraph for information on how to locate and adjust these trimmers). If there is the need to reduce the amplifier gain, to maintain an high efficiency, this board regulates the output power gain loop adjusting, first of all, the MOSFET Drain-Source voltage (the voltage can be regulated from 48 down to 30V). If this isn't sufficient, then the BIAS voltage is be also reduced (please see the bottom note).

As soon as the equipment is powered, the fans will start turning at the minimum speed. Then, the control board will change their speed according to the heatsink temperature (i.e. the environmental one).

5.4.a Adjustment of the maximum output Power level

With the equipment working, increase the level of the input R.F. driving power until the output one reaches 2400W (measured with a hi-precision power meter). Now with **RV3** adjust the output power level until the measurement instrument reading is 2000W.

Do not exceed 30W as maximum driving input power!

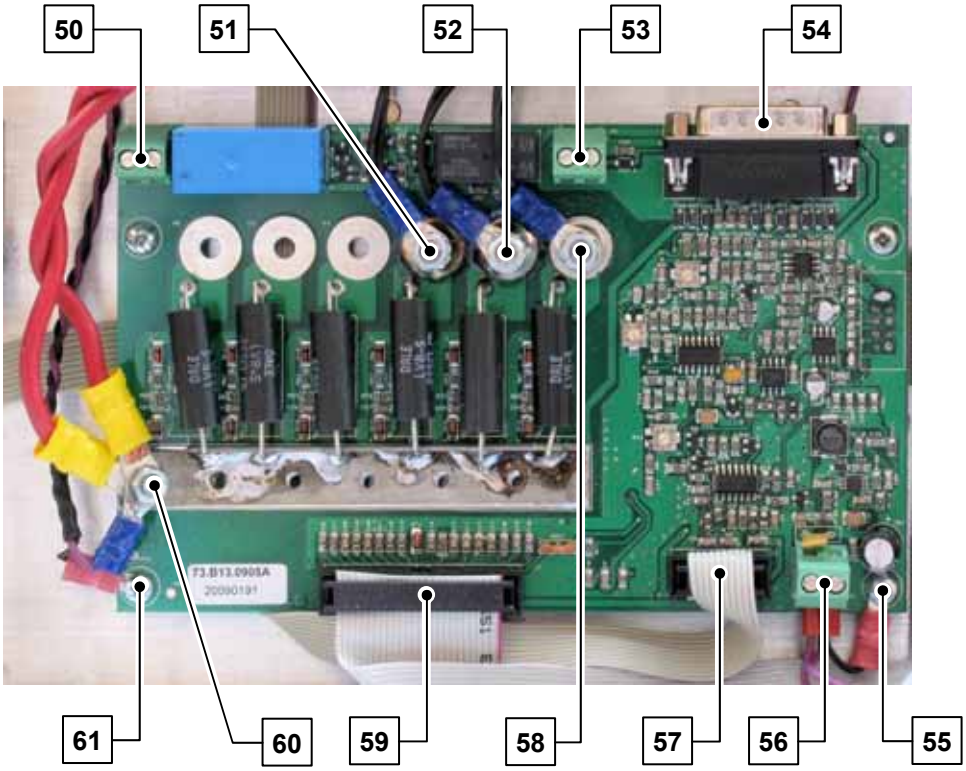


Analog board

5.4.b Adjustment of direct and reflected power levels readings

With the equipment in normal operation (ON mode), and the display showing the working page (⇨9.1), check with an hi-precision R.F. power-meter that the output power is 2000W, then adjust **RV2** until the display shows the same direct power reading. Check the reflected power level with an hi-precision directional power meter, then adjust the reflected power level reading accordingly using **RV1**.

5.4.c Analog board connections



[50] **Exciter enabling/disabling command output** – this signal (relay contacts) is sent to a connector (if present) located on the rear panel.

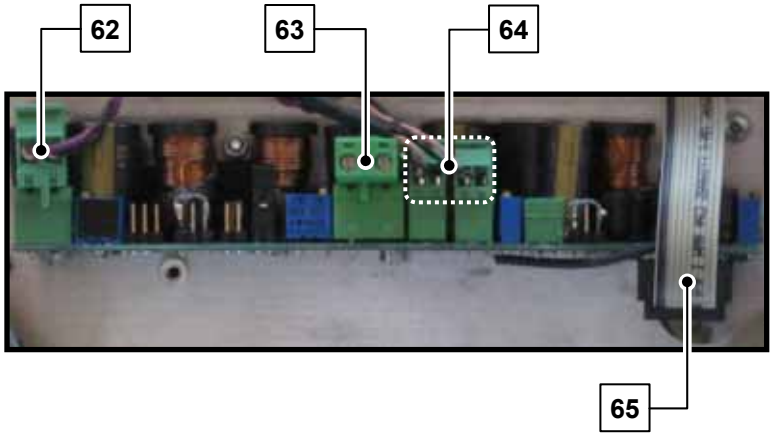
[51] **48V_{DC} power supply for the 800W amplifier module #3** – the (black) power resistor is used for the current measurement.
[52] **48V_{DC} power supply for the 800W amplifier module #2** – the (black) power resistor is used for the current measurement.
[53] **External stand-by input command** – coming (if present) from the rear panel. A short-circuit between the two contacts sets the Eagle2000 in stand-by mode.
[54] **Telemetry data bus** – connected with the **REMOTE I/O** port (if present) located on the rear panel.
[55] **Ground.**
[56] **15V_{DC} power supply** – from aux power supply.
[57] **Data bus with the Power Supply unit**.
[58] **48V_{DC} power supply for the 800W amplifier module #1** – the (black) power resistor is used for the current measurement.
[59] **Data bus between the analog board and the CPU board.**
[60] **Primary junction for the 48 V_{DC} power supply.**
[61] **Power supply for the fan control board.**

5.5 Fans control board

This board features two separated power supply outputs: a power supply for the two fans cooling the heatsink and another one for the fan of the power supply unit. The rated power supply is 24 V_{DC}, this is why only this service board is powered at 48V_{DC}. This board gets information directly from the R.F. amplifier section via a flat cable.

*To assure the **maximum reliability**, the equipment has been designed to allow the fans operation even if this board is broken (in this case event the fans will turn at the maximum speed in order to assure the maximum safety).*

5.5.a Fans control board connections



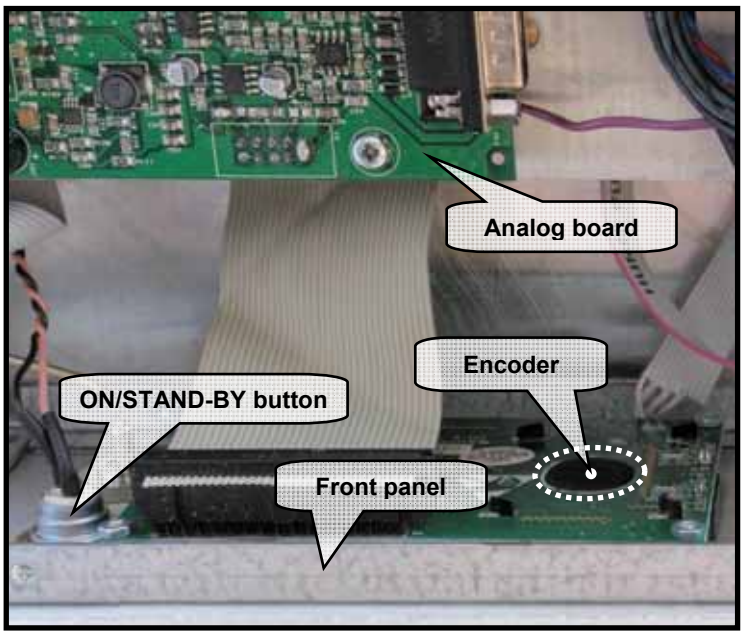
[62] **48V_{DC} power supply input**.
[63] **Power supply output for the power supply unit fan.**
[64] **Power supply outputs for the fans cooling R.F. amplifier heatsink.**
[65] **Data bus from the R.F. amplifier unit** – this flat cable sends data referred to the operation of the **R.F. amplifier unit**. This bus is common both for the **fans control board** and the **analog board**.

5.6 LCD display and control panel board

This board integrates the LCD display [6], various LEDs and the **ON/STAND-BY** button [1] (for further details ⇨4.2). By communicating directly with the CPU, the LCD display keeps the user informed with various information and messages (e.g. menus, alarms etc.).

5.7 Digital encoder (multifunction knob)

This board is located in the back of the front panel near the ON/STAND-BY button [1] and the Analog board (⇨5.4). It holds the rotary digital encoder, directly connected to the multifunction knob [7]. The board communicates directly with the Control (CPU) board (⇨5.3), which detects the user commands: clockwise rotations, counterclockwise ones, as well as pushbutton operations.



The proper operation of the digital encoder is detected by the Control (CPU) board and checked by the dedicated menu (⇨9.5.c).

6 INSTALLATION

Warning: to ensure safe functioning of the equipment, it's absolutely mandatory to comply with the instructions of the present chapter.

6.1 Checking the supplied parts

Before using your amplifier, make sure that the following parts are included in the packing:

- The amplifier
- The user's manual (this manual)

As an option (to be supplied on demand) there would be a RG58 N-N cable, 1 meter length, to connect the amplifier to the exciter.

In case some parts are damaged or missing, promptly contact your supplier.

6.2 General safety rules

Warning: in order to prevent serious damages to objects and people, the following rules must be strictly followed.

- Although in most cases no special instruments are required, the equipment must be installed by skilled personnel only. To make best use of the equipment and prevent damage to the unit, compliance with the instructions of the present manual is mandatory. Should doubts or technical problems arise during the installation procedure, you are strongly recommended to contact Quark or a local appointed agent/dealer.
- Should you encounter any technical problems or be in any doubts about the installation procedure, Quark will be happy to provide its qualified technical support service. We strongly recommend that no interventions must be carried out by personnel not authorized by Quark.
- As a rule, the user should not have access to the inner parts of the equipment. Tampering with the factory settings makes our warranty null and void and might also affect the equipment performance, causing expensive damages.
- No adjustments or internal settings are required for normal operations. The equipment shall be properly earthed and be operated with all the covers closed to prevent electrical hazards and fully comply with EC, EMI and all local safety requirements.
- Never touch the inner parts of the equipment without first disconnecting it from the AC power line. Dangerous AC, DC and radio-frequency voltages are available inside and become accessible when the covers are removed.

6.3 Placing the equipment

6.3.a Choosing the proper room and location

- Install the equipment in a dry, sheltered but well-ventilated room away from dust, moisture, insects, rodents and vermin (e.g. mice).
- Room size shall be such that the equipment can be placed in an upright position and that the technical personnel can easily carry out routine or extraordinary maintenance.
- Place the equipment as close as possible to the antenna in order to prevent excessive power loss in the cables. If this is not feasible, use antenna low-loss cables of suitable cross-section.
- Vents in the walls and any other openings shall be fitted with metal grids to keep rodents and insects out and with a dust filter. Make absolutely sure that no water could penetrate through the vents or the air exhaust duct or the antenna-cable grommet, and that the floor cannot be flooded during heavy rainfall.

6.3.b Environmental Conditions

- In order to achieve the best possible performance in terms of power, life span, etc., the ideal room temperature should range between -10°C and + 45°C. The pre-set over-temperature alarm will work when the limit of 45°C is exceeded. It is advisable to install in the room a min-max thermometer to display any variation.
- The room must be ventilated to ensure that the temperature never exceeds 45°C. Such conditions CANNOT be generally met when the exhaust cooling air is not pushed outside and is instead fed back into the room. This is even truer if more than one unit is installed in the same location. An efficient ventilation system is thus required in the room. Air exchange in the room shall have a minimum flow-rate of 500 meters per hour or more.
- As a rule, if the equipment is fitted in a rack, the rear cover cannot be secured. If it is required that the equipment be totally enclosed, a forced ventilation and air extraction system must be provided. In order to assist the air flow an exhaust ventilation system with a flange must be connected to a hot air exhaust duct communicating with the exterior. In this case, bear in mind

that the Eagle 2000 internal fans are low-pressure units and therefore an air extractor on the air exhaust duct in definitely needed.

- Air conditioning at 20 – 25 °C would obviously be the best solution. Thermal insulation and efficient ventilation with a thermostat-controlled blower are generally the best solution.
- Even moisture and/or dust, when excessively present in the air or in the room, may cause condensation build-up in the amplifier. If the system is periodically switched on and off, this can trigger destructive electric arcs and short circuits and thus cause damage which is not covered by warranty.

6.3.c Electrical conditions

- Eagle 2000 is powered by a single-phase line. The power grid capacity should be configured and dimensioned to suitably meet (with a sufficient safety margin) the consumption needs of the device.
- The single-phase AC power line nominal voltage range comes from 180 to 240 V_{AC}. For further details about the AC power line ⇨5.1.
- Fluctuations of the power line and electric discharges due to weather or nearby industrial machinery may cause significant trouble, especially in mountain areas and in locations close to industrial areas.
- In many cases, it is advisable, if not mandatory, to install a protector, an insulating transformer or possibly an electromechanical AC power voltage regulator.

Since the total cost of the plant, inclusive of broadcasting equipment, antenna system and installation is rather high, a certain percentage of the budget should be evaluated for buying and installing suitable protection and conditioning facilities as described above. It has to be considered that such additional costs will be absorbed very quickly since the equipment will work under ideal conditions, its useful life-span will increase and, above all, the incidence of accidental breakdown due to environment or power line trouble will be reduced.

6.4 Connecting the equipment

6.4.a Connecting the antenna

- A 7/16 output connector is fitted to the rear of the amplifier module. It's very important to check that antenna, cables and connectors are suited for 2kW.
- The antenna divider is also expected to have adequate power. Its input connector must be 7/16 or larger.
- As a rule, the cable connecting the amplifier to the antenna must be of the corrugated, sponge dielectric type, or 7/16 Cellflex and Flexwell cables. Smaller cables cannot be used.
- The antenna will be earthed through a copper braid of suitable cross section to prevent lightning or static electricity from reaching the amplifier through the antenna cable.

6.4.b Connecting the AC power line

Wire the power supply connector of the equipment to a suitable single-phase (nominal voltage 230V_{AC}) power supply source.

Before connecting the power supply cable, make sure that the amplifier will be compatible with the power supply source you are planning to use.

The power supplied by the AC power socket must comply with what stated in the paragraph 6.3.c.

Operation near the lower input voltage on high impedance lines must be avoided: if the power line voltage drops below a certain limit at full load, the low line sense circuitry may trigger an oscillating turn-on/turn-off cycle, which is very dangerous. In this case, it is advisable to use an external line stabilizer.

In order to ensure proper operation and comply with the safety regulations, an efficient connection to earth is required. Use the yellow/green lead in the power cable. The cable neutral lead is blue. Never connect the earth to the power line neutral lead.

Use only the power supply cable supplied with the amplifier. In case of a cable extension, recommended values are 2.5 to 4 mm^2.

Never switch the equipment on without an antenna connection, even with no R.F. driving.

6.4.c Connecting to the exciter

Warning: The exciting rated power of the amplifier is from 25 to 30W. In order to avoid any damage to the equipment, make sure that the driving power never exceeds 30W.

Proceed in the following way:

1) Connect the exciter to an independent AC power line.
2) Connect the exciter's R.F. output to a suitable dummy load.
3) Switch the exciter on.
4) Set the exciter R.F. output power to zero.
5) Check that the correct FM frequency of the exciter is set.
6) Switch the exciter off and connect the **R.F. IN** connector of the amplifier [12] to the exciter's output through a shielded N-N cable.

7 BASIC OPERATIONS

7.1 Turning on/turning off

7.1.a First switching on (during installation)

The amplifier stores in its memory the operation mode in which it was working before the power supply was turned off or a power line interruption (blackout) took place. Therefore, depending on whether it had been previously turned on or not, the switch-on operations may vary as follows.

The amplifier output power must be adjusted only and exclusively through the menu of the amplifier itself, and NOT through the driving power. For this reason, follow the instructions below.

1) Make sure that all installation conditions as described in Chapter 6 are met, and that all connections described in 6.4.a, 6.4.b, 6.4.c have been properly made. You can connect a proper dummy load to the amplifier's R.F. output instead of the antenna.
2) Make sure that the exciter output power is zero.
3) Turn on the power supply switch [14] on the rear side.
4) At this stage, two conditions may take place:
   - **The amplifier turns on,** so do the fans and the display (see note below). This usually – and automatically - happens after an AC power line black out. If so, you can skip directly to point 6)
   - **The amplifier DOESN'T turn on,** the display will briefly show some screenshots before entering in **`Stand-by`** mode - In such case go to the next step.
5) Keep the **ON/STAND-BY** button [1] pressed for a couple of seconds: the amplifier and the fans will turn on. The display briefly shows some screenshots. At the end the green **ON** LED will steadily glow and the working page (the one normally shown in the normal operation ⇨9.2) will steadily stay on the display:

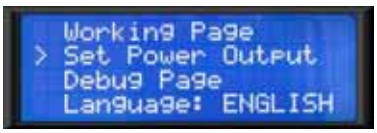
6) Switch on the exciter.
7) Gradually increase the driving power until it reaches 25 or 30W. Under these conditions, the amplifier will not yet deliver its output power.

Warning: DO NOT exceed the 30W level for the driving power, otherwise the equipment could be damaged.

As soon as the equipment is powered, the fans will start turning at the minimum speed. Then, the control board will change their speed according to the heatsink temperature (i.e. the environmental one).

7.1.b Adjusting the output power

8) Should you wish to adjust the output power, from the over stated working page press the knob (as it was a normal pushbutton) in order to access the main menu, then turn the knob counterclockwise in order to move the cursor **>** downward to the left of **`Set Power Output`** as per the following picture (for the use of the menus ⇨Par.9):



9) Press the multifunction knob and the following menus will be shown:

10) Ensure that the **>** cursor is placed on the left of the **`SET For.Pow`** menu (if not, turn the multifunction knob until you reach it).

11) Press the multifunction knob to select this menu and move the **>** cursor on the right of the power value (in this example 100 – see the following note):

12) Gradually turn the multifunction knob until you set the needed output power (clockwise to increase the value, counterclockwise to reduce it). The forth line (**`Dir ...Ref…`**) will show the measured direct and reflected power values.

13) Press the multifunction knob to enter the selected power. The cursor will be moved on the left side of the option (in the following image the power was set to 91 %):

14) Turn the knob counterclockwise in order to move the **>** cursor to **`Confirm Changes`**, then press the knob to save the settings and come back to the main menu.

IMPORTANT: do not exceed the rated output power (2000W or 100% in Stand-by mode).

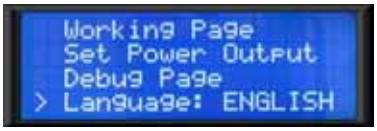
When setting output power with the equipment in normal operation (ON status), if the reflected power exceeds the 200W value, the system will release an alarm because of the excessive V.S.W.R. (Voltage Standing Wave Ratio). In this case check the antenna system to reduce as much as possible the reflected power.

Warning: operation without antenna, or with a faulty antenna, may cause degradation and possible destruction of the R.F. power stage. Such failures are not covered by our standard warranty.

*Step 11 - the previous images refer to the first switch on with the equipment in stand-by mode. In this condition power value is in percentage and referred to a logarithmic scale – meaning, for example, that the setting **`50`** will be about ¾ of the rated power level (1500W). When the equipment is normally working, the **`SET For.Pow`** value will be given in W. The forth row (**`Dir ...Ref`**) will also show the direct and reflected power levels in W.*

7.1.c Setting the display language

15) Should you wish to change the language used on LCD display, from the main menu turn the knob counterclockwise in order to move the cursor **>** downward to the left of **`Language`** as per the following picture:



16) With the **>** cursor still on the left of **`Language`** (showing also the current used language), press the knob. Every time the knob is pressed an alternative language is selected.

Note that you are still inside the main menu, so no operations are necessary to come back to it.

7.1.d Setting date and time

Setting date and time is important to manage some time-related functions (e.g. ⇨10.1.a and 10.1.d). Do that in the following way:

17) To change the date and time, from the main menu turn the knob counterclockwise in order to move the cursor **>** downward and access the second page of the main menu as per the following picture. Keep on rotating the knob till moving the cursor **>** to the left of **`Set Clock`**:

18) Press the knob. The **Set Clock** menu will be shown (split in two pages):

19) Turn the knob counterclockwise in order to move the cursor **>** downward to the left of **Year**.

20) Press the knob. The cursor **>** will move to the right of **Year** and the year will become editable.

21) Turn the knob to set the year (e.g. 2039):

22) Press the knob to enter the setting (the cursor **>** will come back to the left of **Year**).

23) If necessary, repeat the steps 19) to 22) with **Month, Day**, **Hour, Minute** and **Second**.

24) Turn the knob counterclockwise in order to move the cursor **>** downward to the left of **Confirm Changes** (the last option).

25) Press the knob to confirm the settings and come back to the main menu.

26) Turn the knob clockwise in order to move the cursor **>** upward to the left of **Working Page** (the first option),

27) Press the knob. The display will go back to the working page.

The installation of the amplifier is now completed. A spectrum analysis would be advisable to make sure that no spurious emissions, due to internal or external causes (i.e. intermodulation on the final stage), are generated.

Quark wish you success in your work and remind you that we are always available for further information or to solve any specific problem.

7.1.e Turning off

1) Keep the **ON/STANDBY** button [1] pressed for a couple of seconds setting the equipment in stand-by mode.
2) Turn off the **POWER ON/OFF** switch [14] on the rear panel.

8 USE OF THE MENUS

8.1 Use of the multifunction knob

The multifunction knob is used to surf the menu with its submenus and set/check their parameters. It can be used in 3 ways:

- **By turning it clockwise (fig. 1)** - while a menu is being displayed, this moves the **>** cursor upwards.

figure 1

figure 2

- **By turning it counterclockwise (fig. 2)** - while a menu is being displayed, this moves the **>** cursor downwards.
- **By pressing it as it was a normal pushbutton (fig. 3**) - while a menu is being displayed this activate the option currently pointed by the **>** cursor. While a password-related menu is displayed, this enter the value set in the digit pointed by the **Λ** cursor.

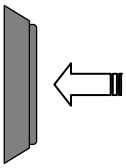


figure 3

8.2 Navigating the menu

In the menu navigation, generally speaking, the use of the knob is the following:

1) From the working page (⇨9.2):

2) Press the knob. The display will show the main menu (which is split in two pages):

3) Turn the knob until the **>** cursor on the left points one of the over stated menus.
4) Press the knob to select the needed menu.
5) If necessary (according to the selected menu), repeat one or two times these last two steps in order to access to further submenus (e.g. in the **`Debug Page`**).
6) According to the needed option is accessed, you can:
   - See the shown parameter(s) as explained in each dedicated paragraph, then go to step 8).
   - Change the selected parameter(s). In this case go to step 7).
7) As explained in each dedicated paragraph, use the knob to set the needed parameter, then be sure to confirm it (usually by means of the menu **`Confirm Changes`** - ⇨next paragraph).
8) Exit the menu with the appropriate commands (see each dedicated paragraph) and come back to the working page as explained in each dedicated paragraph.

The described commands are to be considered as standard actions (bear in mind that in some menus they are slightly different). For details about the each single menu and how operate on it ⇨Chapt. 9 - Menu description.

After 4 minutes of inactivity (no actions on the knob), the system automatically quits the currently shown menu going back to the working page. After an operation within the menus, it's however advisable to manually go back to the working page by selecting in the main menu the first option – **`Working Page`** *– and pressing the knob.*

8.3 Confirming/quitting the settings

Some menus allow to set the parameters or way of operation of the amplifier (e.g. **`Set Power Output`**). Apart some exceptions (e.g. **`Language`** which is in the main menu), the following operation are needed to confirm the entered settings:

1) Be sure to have entered the needed setting (e.g. the output power as shown below):

2) Turn the knob counterclockwise in order to move the **>** cursor to **`Confirm Changes`**.

3) Press the knob to save the settings and come back to the main menu.

If you entered a wrong setting, you can quit the menu without saving it. To do so, just select **`Ignore Changes`** *as step 2.*

Some confirming/quitting operations might slightly change according to the menu. Please refer to each dedicated paragraph.

In order to make this manual simpler, `Confirm Changes` and `Ignore Changes` commands won't be stated from the available options from now. They'll be stated just in the description of the steps to follow.

9 MENU DESCRIPTION

9.1 Startup page

When the equipment is turned on by means of the **POWER ON/OFF** switch [14] located on the rear panel, the **STAND-BY** yellow LED [9] will glow and the equipment temporarily displays the startup page containing the following information:

- **QUARK EAGLE**: model of the equipment
- **Rev.1.06**: revision number
- **Function**: equipment working mode - **MASTER** (standalone single equipment mode) or **SLAVE** (controlled by an external management unit within a broadcasting system)
- **Power Size**: rated output power (⇨10.1)

After some seconds, the display will switch to the working page (⇨following paragraph).

9.2 Working Page

The working page is the one displayed in normal operation and shows the most important information related to the amplifier. In fact, inside the menu, after 4 minutes of inactivity (no actions on the knob), a timer automatically quits the menu restoring the working page. These are the information displayed in it:

- **QUARK EAGLE rev.1.06**: model of the equipment and software revision
- **Forward Power**: forward power level
- **Reflected Power**: reflected power level
- **10 Sep 2010 12.04.42**: system date and time (see bottom note)

To access the main menu from the working page (⇨9.2), press the knob.

The display backlight has a three minutes timeout. To switch on the backlight turn the multifunction knob.

The system time is shown in 24-hour format.

9.3 Main menu

As explained, the main menu is accessed by pressing the knob from the working page.

If necessary, to come back to the working page turn the knob clockwise to move the cursor **>** upward to the left of **Working Page** (the first option), then press the knob to come back to the working page.

The main menu is split in two pages:

- **Working Page**: leads back to the working page as over explained

- **`Set Power Output`**: sets the output power (⇨9.4)
- **`Debug Page`**: reads some measurements, checks the knob/digital encoder operation and current alarms (⇨9.5)
- **`Language`**: sets the display language (⇨9.6)
- **`Set Function, Size`** allows to set the master or slave mode, to automatically reduce the power in certain times, to show the time with the equipment in normal operation, alarm and stand-by mode, etc (⇨10)
- **`Set LCD Contrast`**: sets the LCD contrast (⇨9.7)
- **`Set Clock`**: sets date and time of the system clock (⇨9.9)
- **`Info Page`**: it shows info about Quark (email, technical support telephone number) (⇨9.10).

9.4 `Set Power Output` menu

Refer to par. 7.1.b in which this menu is already explained.

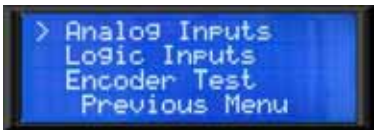
After you entered the needed power level, don't forget to confirm it: select **`Confirm Changes`** and press the knob (or, to quit the menu without changing the previous setting, select **`Ignore Changes`** and press the knob). For information about these commands ⇨8.3.

9.5 `Debug Page` menu

This menu shows some analog measurements (forward and reflected output power, driving input power, bias voltage, temperature of the heatsink, etc.), checks the operation of the **ON/STAND-BY** button and digital encoder of the multifunction knob. It also shows the presence of a stand-by command coming from the **REMOTE I/O** connector [16] and any eventual current alarms.

1) Turn the knob counterclockwise in order to move the **>** cursor to the left of **`Debug Page`**:

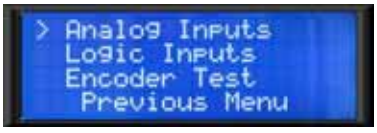
2) Press the knob. The debug page will be shown:



- **`Analog Inputs`**: shows the analog measurements (⇨9.5.a)
- **`Logic Inputs`**: checks the operation of the **ON/STAND-BY** button, if there is an external stand-by command and shows if one or more alarms are currently released (⇨9.5.b)
- **`Encoder Test`**: checks the operation of the digital encoder of the knob (⇨9.5.c)
- **`Previous Menu:`** leads back to the main menu

9.5.a `Analog Inputs` menu

1) From the debug page (⇨the previous paragraph), ensure that the **>** cursor is on the left of **`Analog Inputs`** menu (otherwise turn the knob counterclockwise in order to move it to this place), then press the multifunction knob.



2) The read-only **Analog Inputs** menu will show. It's split in three pages and lists the results of internally carried out measurements:

- **Forward Power**: forward output power level
- **Input Power**: driving input power level
- **Reflected P.**: reflected power level
- **BIAS Volt:** bias voltage.

In stand-by mode the **BIAS Volt** *value is* **NEGAT** *(negative), whereas during the normal operation it will be a voltage value*

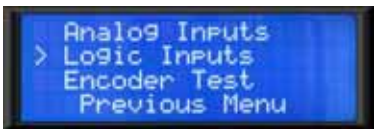
- **Heatsink T. C**: temperature of the amplifier section heatsink (in °C)
- **Ambient T. C**: environmental temperature (in °C).
- **Main Voltage**: power supply voltage of the MOS FETs
- **Module Curr. 1**: current of the amplifier module # 1
- **Module Curr. 2**: current of the amplifier module # 2
- **Module Curr. 3**: current of the amplifier module # 3
- **Module Curr. 4**: current of the amplifier module # 4 (not used with Eagle 2000).

To quit and go back to the **Debug Page**, press the knob.

9.5.b Logic Inputs menu

This menu allows to check the proper operation of the **ON/STAND-BY** button by checking its dedicated contacts of the control board. Moreover, it shows the presence of an external stand-by command coming from the **REMOTE I/O** connector [16]. Finally, it shows if one or more alarms are currently released (⇨12.2).

1) From the **Debug Page** (⇨9.5), select **Logic Inputs**.



2) Press the knob. The **Logic Inputs** page will be shown (see bottom note):

- **Start Button**: proper operation of the **ON/STAND-BY** button. It is tested on the related contacts in the CPU board (in order to also test the wirings). When pressed, **OFF** changes into **ON**
- **standby**: if case of an active stand-by command, you will see **ON**
- (alarm name) - if one or more alarms are currently released it/they will be shown from this line (see bottom note)

3) To quit and go back to the **Debug Page**, press the knob.

If one or more alarms will be released, they will be displayed from the 3rd line, so the **Logic Inputs** *page could be eventually split in two ones in order to make sufficient room to accommodate the alarm(s). To scroll the alarms, simply turn the knob counterclockwise.*

9.5.c `Encoder Test` menu

This menu allows to check the correct operation of the digital encoder connected to the knob.

1) From the **`Debug Page`** (⇨9.5), select **`Encoder Test`**:

2) Press the knob. The **`Encoder Test`** menu will be shown:

3) Turn the knob and check if the **A** and **B** values are changing. As an example, the following image was taken after having turned a bit the knob starting from the previous image:

4) To quit and go back to the **`Debug Page`**, press the knob.

9.6 `Language` menu

Refer to par. 7.1.c in which this menu is already explained.

After setting the language, you are still inside the main menu, so no operation are necessary to come back to it. Instead, you might decide to come back to the working page by turning the knob clockwise in order to move the cursor **>** upward to the left of **`Working Page`** (the first option), then press the knob to come back to the working page.

9.7 `Set Function, Size` menu

It's a special password-protected technical menu. For detailed information, see the dedicated Chapter 10.

9.8 `Set LCD Contrast` menu

1) From the main menu (⇨9.3), select the **`LCD Contrast`** option:

2) Press the knob. The **`LCD Contrast`** menu will show the current level of the LCD contrast (in this example 140):

3) Ensure that the cursor is placed to the left of **`LCD Contrast`** as in the previous image (otherwise turn the knob to move it), then press the knob. The cursor will move on the right of **`LCD Contrast`**:

4) Turn the knob to change the LCD contrast and you will directly see the result of the adjustments. Here are some images showing how the contrast changes turning the knob:

5) When the needed contrast level is set, press the knob. The cursor will move on the left:

6) To confirm the entered settings, select **`Confirm Changes`** and press the knob (or, to quit the menu without changing the previous setting, select **`Ignore Changes`** and press the knob).

For information about **`Confirm Changes`** *and* **`Ignore Changes`** *commands* ⇨*8.3.*

9.9 `Set Clock` menu

Refer to par. 7.1.b in which this menu is already explained.

After you entered the clock settings, don't forget to confirm them: select **`Confirm Changes`** and press the knob (or, to quit the menu without changing the previous setting, select **`Ignore Changes`** and press the knob). For information about these commands ⇨7.3.

9.10 `Info Page` menu

This menu shows the contact information of Quark (email, technical support telephone number) in order to get in touch with it in case of support is needed.

1) From the main menu (⇨9.3), select the **`Info Page`** option:

2) Press the knob. The **`Info Page`** will show the following information:

- **`QUARK elect. systems`**: brand name
- **`email: info@quarkelectronics.it`**: email address of Quark
- **`0039 02 45073447`**: Quark Technical Support telephone number.

3) To quit the menu and come back to the main menu, press the knob.

10 SET FUNCTION, SIZE MENU

This multilevel technical menu allows to set the equipment as MASTER or SLAVE, set its power size (according to the model), check the time in which it worked in normal operation or other conditions and automatically reduce its output power in certain times.

This menu is password protected. The factory default password is **000000** and can be changed (⇨10.1.e).

1) From the main menu, turn the knob counterclockwise in order to move the cursor down to **Set Function, Size**:

2) Press the knob. You are prompted to insert the password (six digits in total). The cursor **Λ** points its first digit.

3) Turn the knob to set the correct number (in the example **0**), then press the knob to enter it and move the cursor **Λ** underneath the second digit:

4) Repeat the last step until all the six digits have been set. When the knob is pressed the sixth time, the whole password will be entered.
5) If the password is correct, the following page will be shown (if not, the display will go back to main menu):

- **ENTER to access Program page**: to access the program page press the knob (⇨10.1).
- **UP-DOWN to set new password**: to change the password turn the knob (⇨10.1.e).

10.1 Program page menu

This technical menu allows to select the equipment as MASTER or SLAVE (⇨9.1), set the power size according to the rated value of each model (⇨ note on par. 5.3), check the time in which the equipment worked in normal operation, was in alarm or in stand-by mode and automatically reduce the output power in certain times (e.g. in the night).

1) After having entered the **Set Function, Size** menu with the correct password as over stated, the display will show:

2) Press the knob. The program page will be shown. It's split in two pages:

- **Function**: operation as **MASTER** or **SLAVE** (⇨10.1.a)

- **`Power Size`**: power size according to the rated value of each model (⇨10.1.b)
- **`Show timers`**: time in normal operation, alarm or stand-by mode (⇨10.1.c)
- **`Set power saver`**: power saver time settings (⇨10.1.d)

For information about **`Confirm Changes`** *and* **`Ignore Changes`** *commands ⇨8.3.*

10.1.a `Function menu`

This menu allows to set the equipment as MASTER (standalone single equipment) or SLAVE (working within a broadcasting system). If the equipment is set as SLAVE, it will stay in stand-by mode until a proper signal will come from the DB25 **REMOTE I/O** connector [16].

The REMOTE I/O connector will be available only in the next version of Eagle 2000. If you set in SLAVE mode an equipment not provided with such this connector, it won't be able to properly work.

To set the equipment in MASTER or SLAVE mode.

1) In the program page, ensure that the cursor **>** is on the left of **`Function`** (if not, turn the knob in order to move the cursor **>** this way.

2) Press the knob repeatedly till reading MASTER or SLAVE according to your needs.
3) Should you have other settings to do in the **`Program Page`**, directly skip to one of the following paragraphs. If not, go on with the next step (see note at the bottom).
4) To confirm the entered setting, select **`Confirm Changes`** and press the knob (or, to quit the menu without changing the previous setting, select **`Ignore Changes`** and press the knob).

Step 3 - note that you are still inside the program page, so no operations are necessary to come back to it, but you haven't still stored the entered setting, so performing step 4 is mandatory.

If the equipment is used within a broadcasting system (set to **SLAVE***) and the other amplifier develops a fault, the working equipment can be used alone by setting it as* **`MASTER`***.*

10.1.b `Power size menu`

This menu allows to set the power size according to the rated value of each model. This allows to use the same control board as "universal" spare part for all the Eagle models (⇨ note on par. 5.3).To do that:

1) In the program page, ensure that the cursor **>** is on the left of **`Function`** (if not, turn the knob in order to move the cursor **>** this way.

2) Press the knob repeatedly till reading the proper power size (2000 W for Eagle 2000).
3) Should you have other settings to do in the program page, directly skip to one of the following paragraphs. If not, go on with the next step (see note at the bottom).
4) To confirm the entered setting, select **`Confirm Changes`** and press the knob (or, to quit the menu without changing the previous setting, select **`Ignore Changes`** and press the knob).

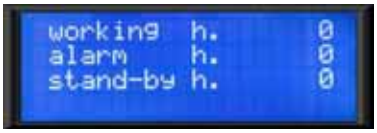
Step 3 - note that you are still inside the program page, so no operations are necessary to come back to it, but you haven't still stored the entered setting.

10.1.c `Show Timers` menu

This option allows to see a page showing the number of working hours, hours with active alarms, stand by hours.

1) In the program page (⇨10.1), turn counterclockwise the knob scrolling down until **`Show timers`**:

2) Press the knob, the **Show timers** menu is shown:



- **`working h.`**: number of hours with the equipment in normal operation
- **`alarm h.`**: number of hours with the equipment showing alarms
- **`Stand-by h.`**: number of hours with the equipment in stand-by mode

3) To quit this menu and go back to the program page, press the knob (see note).

Step 3 – If you have set some settings with the other menus of the program page, don't forget that they aren't still stored until you select the option **`Confirm Changes`** *and press the knob.*

10.1.d `Set power saver` menu

This option sets a certain time in which the equipment automatically reduces its output power (e.g. during some hours in the night). You can set both the needed power reduction as well as the low-power time in which it will be automatically set.

1) In the program page (⇨10.1), turn counterclockwise the knob scrolling down until **`Set power saver`**:

2) Press the knob, the **`Set power saver`** menu is shown:

- **`For. Power %`**: proportional reduction of the forward power during the power saver time
- **`Start h.m`**: time in hours and minutes from which the power saver starts
- **`End h.m`**: time in hours and minutes to which the power saver ends
- **`Previous Menu`**: return to the program page

3) Move the cursor **>** to **`For. Power %`** (see the previous image). Press the knob to move the cursor on the right.

4) Turn the knob to set the reduction percentage and press the knob to enter the set value (see the note at the bottom).

5) To set the power saver starting time, move the cursor to the left of **`Start h.m`**:

6) Press the knob. The cursor will move on the right of the **`Start h.m`**:

7) Turn the knob to set the start time, then press the knob to confirm. The cursor will move back on the left of **`Start`**:

8) Move the cursor to the left of **`End h. m.`** in order to set the end time (see warning at the bottom).

9) Press the knob. The cursor will move on the right of the **`End h. m.`**:

10) Turn the knob to set the end hour, then press the knob to enter the settings and move back the cursor on the left of **`End h. m.`**

11) Select **`Previous Menu`** to go back to the program page (⇨10.1), then press the knob.

12) To confirm the entered settings, select **`Confirm Changes`** and press the knob (or, to quit the menu without changing the previous setting, select **`Ignore Changes`** and press the knob). See the following warning.

Step 4 - when the value is shown as a percentage, this is related to a logarithmic scale. This means, for example, that by setting "50" the actual forward power value will be about ¾ of the rated power level (about 1500W).

Steps 7 and 10 – the start and end time are in 24 hours format. In the over stated example it will start from 1:10 A.M. and will end to 2:19 A.M.

Step 7 - the ending time (`End h.m`) must be subsequent to the starting one (`Start h.m`), <u>otherwise the power saver time will start at the ending time and will end at the starting hour</u>.

Step 11 - The `Previous Menu` command doesn't save any settings, so after it the `Confirm Changes` command must be mandatorily used. For information about this command ⇨7.3.

10.1.e `Set a new password` menu

The default password to access the **`Set Function, Size`** menu is **`000000`**. For a better security, it's recommended to change it as follows (see notes and warnings at the bottom).

1) As explained on par. 10, after accessing **`Set Function, Size`** menu with the correct password, the display will show:

2) To set a new password turn the knob. The following menu will be shown:

3) The cursor **Λ** points the first digit of the password. Turn the knob to set the new value for this digit, then press the knob to enter it and move the cursor **Λ** underneath the second digit:

4) Repeat the last step until all the six digits has been set.

5) press the knob to enter the whole new password. The display will lead to the main menu.
6) Note down the new password in a secure place.

Don't forget to note down the new password, otherwise you won't be able to access again the Set Function, size menu. To recover a forgotten password, please contact Quark Technical Support.

In case you forgot the new password, to recover it please contact Quark Technical Support.

11 MAINTENANCE AND WARRANTY

11.1 Maintenance

Strictly follow what is written in this paragraph.

11.1.a Clogging by dust

Since the Eagle 2000 amplifier is air cooled, it is subject to clogging by dust. Because of its high-quality materials and manufacturing, if it's installed according to the instructions in Chapter 4, it won't require special maintenance for quite some time.

A regular service routine, mainly to remove internal dust from the filter net mounted inside the front panel (behind the front ventilation grid) [3], is recommended over a 4 to 6 months intervals.

11.1.b Cooling fans

It is recommended to change the cooling fans at 5 year intervals, especially in higher temperature environments. Always use the same high quality type. It is recommended to clean the fans whereas earth or dust are available on the blades. This can be simply done removing the front panel (fixed with eight screws), without removing the fans.

11.1.c Periodic overhaul

After a few years of continuous service, it is advisable to have the equipment overhauled in our factory or in a appointed laboratory, where its operation can be checked against the initial parameters. In addition, any necessary maintenance operations can be carried out.

It is also particularly important to overhauled the equipment when it has been working at high temperatures, over 30÷35°C.

Never change the original settings when the necessary, complex testing equipment and standard calibration are not available.

11.2 Warranty

Like all Quark solid state equipment, the Eagle 2000 carries a one year guarantee on all its components with the exclusion of the final R.F. power module, which may be damaged by faulty output connections.

Notes:

- The above warranty is null and void if the equipment is tampered with or if failure is due to improper use or maintenance, or external causes, such as AC power line overvoltage
- The guarantee is valid only for repairs at our laboratories or at our appointed representative
- The goods shall be delivered carriage prepaid to the laboratory and it shall be returned freight forward
- This guarantee does not cover any consequential damage due to non-operation or faulty operation.

12 TROUBLESHOOTING AND ALARMS

If all instructions described in the current manual are followed, Eagle 2000 will guarantee several years of perfect service. However, should problems arise, see this chapter before contacting the local authorized assistance point.

12.1 Types of alarms and relevant LEDs information

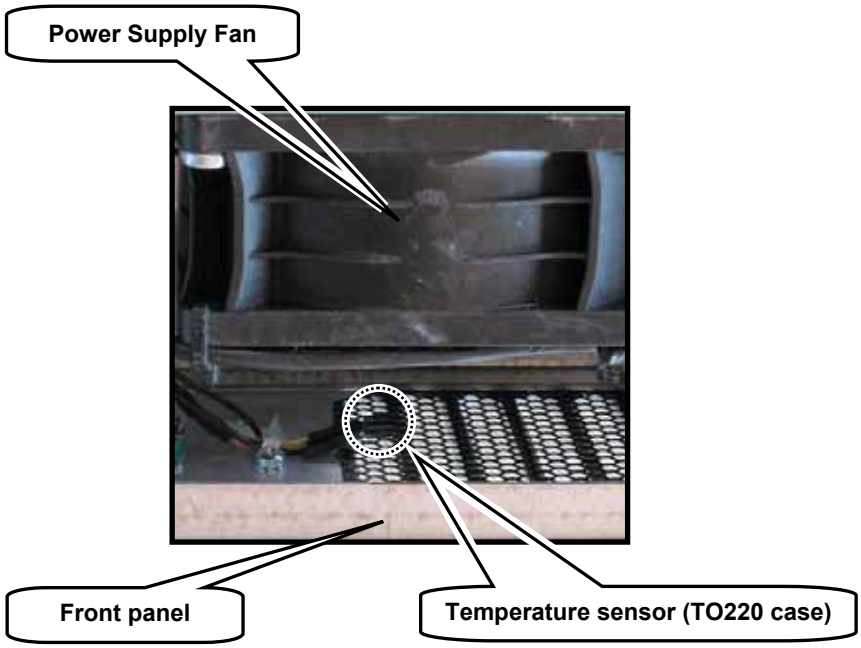
During the operation, two kinds of alarms could happen: non critical alarms (e.g. low output power) and critical alarms.

- Non critical alarms - the **ON** and **ALARM** LEDs are glowing and the **STAND-BY** LED is off. In this condition the equipment can go on working
- Critical alarms - the **ON** LED is off and the **ALARM** and **STAND-BY** LEDs are glowing. In this condition the equipment automatically gets into stand-by mode and the LCD display shows the active alarm name

All alarms are auto-resettable. This means that if an active critical alarm ends (and there are no other active critical alarms) the equipment status automatically reverts from the stand-by mode to the operation one.

Non critical alarms:

- **Reflected power level equal to 200W** - when reaching this value, the equipment reduces its output power in order to keep the reflected power below 200W. The ALARM LED glows, but the unit is still working. If the reflected power exceeds the 200W threshold, the alarm becomes a critical one and the equipment automatically gets into stand-by mode
- **Heatsink temperature** – if this temperature exceeds the 90°C threshold, the ALARM LED glows, but the unit is still working. If the temperature reaches 100°C, the alarm becomes a critical one and the equipment gets into stand-by mode.
- **Environmental temperature** – on the internal side of the front panel there is a temperature sensor in TO220 case which measures the environmental temperature. If this temperature exceeds 45°C, a non-critical alarm is issued and the amplifier reduces its output power according to the internal temperature. If the temperature exceeds 55°C, the equipment automatically gets into stand-by mode, generating a critical alarm.



12.2 Alarm messages

The following table explains the meaning of the alarm messages (which might appear even in normal operation) and indicates some actions to be taken in order to solve the problem.

*The last column specifies if the alarm was due to external (**E**) causes or internal (**I**) problems of the amplifier.*

Alarm message	Meaning	Suggestions	
REFLECTED POWER ALARM	The reflected power is too high	The load (antenna) doesn't match the 50 Ohm impedance. Check the antenna connections	**E**
ENVIRONMENT TEMP. ALARM	The room temperature exceeds 45°C	Check the reasons of the rise of temperature (room ventilation system, air conditioning system, etc.)	**E**
HEATSINK TEMP. ALARM	The heatsink temperature exceeds 90°C (the equipment still works).	Check the fans status and the amplifier circuits working status.	

13 TECHNICAL FEATURES

Frequency range	87.5 ÷ 108 MHz
Modulation	FM
Input power	35W MAX
Output power	0 - 2000W
Spurious emissions	< -80dB
Harmonics emissions	< -75dB
Asynchronous AM S/N ratio	> 65dB, ref 100% AM 400Hz
Synchronous AM S/N ratio	> 60dB, with FM @ 57kHz, 400Hz
R.F. output connector	7/16” flange
R.F. input connector	N type
Monitor connector	BNC
Operating temperature range	from -10 to +45°C
Relative humidity	90% MAX
Power supply	180/240V_{AC}
Dimensions	19” 2 units rack, 500 mm depth
Weight	15 kg
Efficiency	77%
Cooling system	Forced ventilation, CPU controlled. Input/output air temperature difference: 15°C

The above specifications might be changed without prior notice.

14 INDEX

A

Alarms
- LEDs information ... 40
- type of ... 40

Antenna
- connection ... 21

B

Basic operations
- turning off ... 26
- turning on ... 23

C

Circuits description
- Analog board ... 17
- Control (CPU) board ... 16
- Digital encoder ... 19
- Dir and Refl power reading adjustment ... 17
- LCD display and control panel board ... 18
- Main parts location ... 13
- Max Output Power adjustment ... 17
- Power supply relay ... 14; 15
- Power Supply unit ... 14
- R.F. Amplifier ... 15

Circuits Description
- Fans control board ... 18

Climatic conditions ... 20

Confirming/quitting the settings ... 28

Connecting the AC power line ... 21

Connecting the antenna ... 21

Connecting the exciter ... 22

Connections
- AC power line ... 21
- antenna ... 21
- exciter ... 22

Control panel ... 11

D

Date and time
- setting ... 24

Digital encoder ... 11

Display Dir/Ref. power readings adjustment ... 17

Display language
- setting the ... 24

E

Electrical conditions ... 21

Error messages
- messages table ... 41

F

First aid ... 7

Forgotten password ... 38

G

General safety recommendations ... 6

General safety rules ... 20

I

Installation ... 20

Introduction ... 5

L

LEDs
- ALARM ... 12
- alarms information ... 40
- ON ... 12
- STAND BY ... 12

M

Maintenance ... 39

Menu
- Analog Inputs ... 30
- Debug Page ... 30
- Encoder Test ... 32
- Forgotten password ... 38
- Function ... 35
- Info Page ... 33
- Language ... 32
- Logic Inputs ... 31
- main menu ... 29
- Power size ... 35
- Program page ... 34
- Set a new password ... 37
- Set Clock ... 33
- Set Function, Size ... 32
- Set LCD Contrast ... 32
- Set Power Output ... 30
- Set power saver ... 36
- Show Timers ... 36
- Start up page ... 29
- working page ... 29

Menus
- use of ... 27

Multifunction knob ... 11
- use of the ... 27

N

Navigating the menu 27

O

Output power
adjusting the 23
adjusting the Maximum level 17

P

Parts description
control panel 11
front view 11
rear view 12
Placing the equipment
climatic conditions 20
electrical conditions 21
proper room 20
Power supply cable 12

S

Safety
general rules 20
Safety suggestions 6
Set Function, Size menu 34

T

Technical features 42
Turning off 26
Turning on 23
Type of room 20

U

Use of the menus 27
Use of the multifunction knob 27
Used symbols 9

W

Warnings 10
Warranty 39

15 ELECTRICAL, MECHANICAL DIAGRAMS AND PARTS LOCATION

Figure 1 – Front view 46
Figure 2 – Rear view 47
Figure 3 – Top view (open) 48
Figure 4 – Control board (1EL104) – Circuit diagram 1/2 49
Figure 5 – Control board (1EL104) – Circuit diagram 2/2 50
Figure 6 – Control board (1EL104) – Part layout 51
Figure 7 – Control board (1EL104) – Part list 52
Figure 8 – Logic board (1EL105) – Circuit diagram 1/2) 53
Figure 9 – Logic board (1EL105) – Circuit diagram 2/2) 54
Figure 10 – Logic board (1EL105) – Part layout 55
Figure 11 – Logic board (1EL105) – Part list 1/2 56
Figure 12 – Logic board (1EL105) – Part list 2/2 57
Figure 13 – LED board – Part layout 58
Figure 14 – Power Supply unit – Circuit diagram 1/7 59
Figure 15 – Power Supply unit – Circuit diagram 2/7 60
Figure 16 – Power Supply unit – Circuit diagram 3/7 61
Figure 17 – Power Supply unit – Circuit diagram 4/7 62
Figure 18 – Power Supply unit – Circuit diagram 5/7 63
Figure 19 – Power Supply unit – Circuit diagram 6/7 64
Figure 20 – Power Supply unit – Circuit diagram 7/7 65

Figure 1 – Front view

Figure 2 – Rear view

Figure 3 – Top view (open)

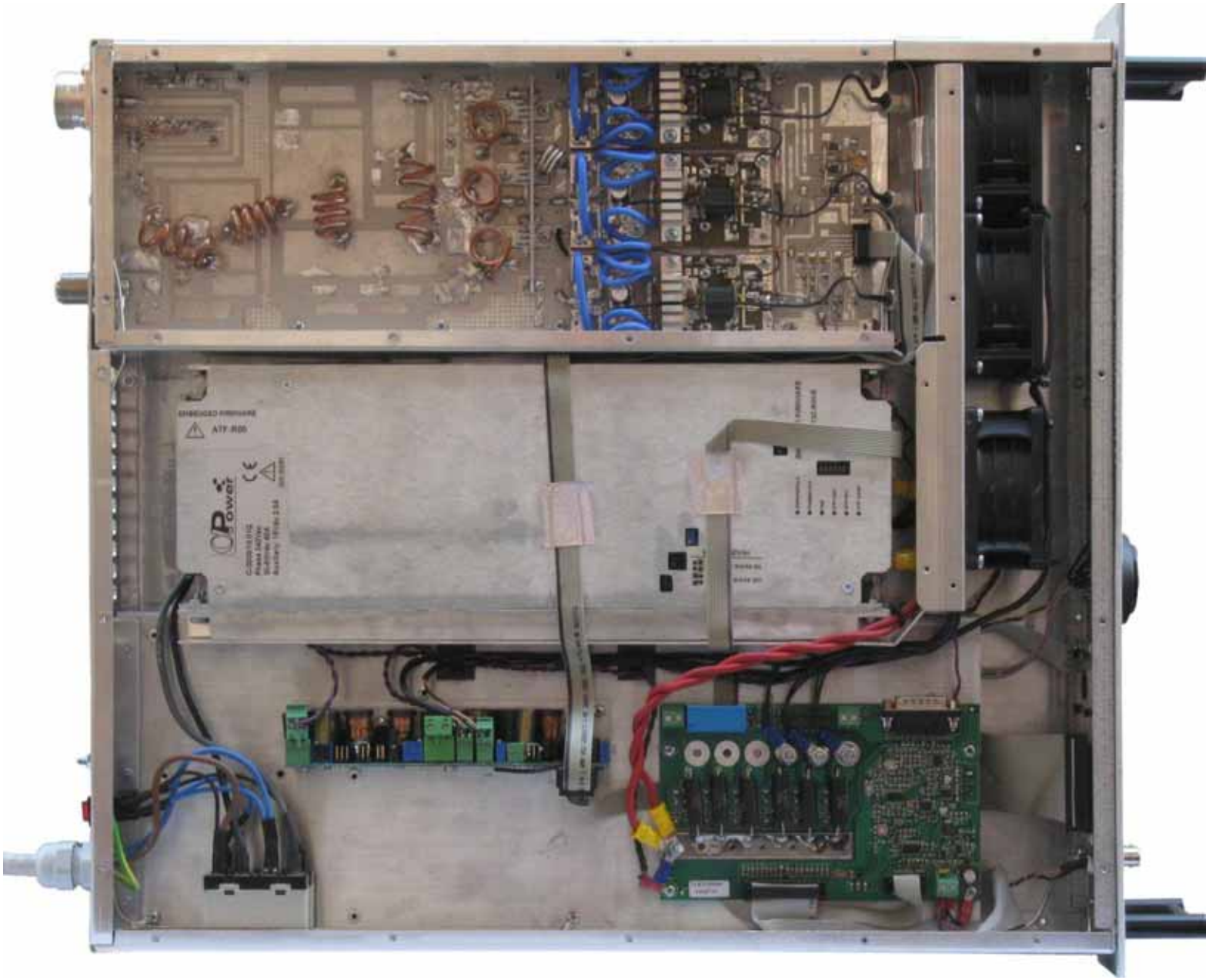


Figure 4 – Control board (1EL104) – Circuit diagram 1/2

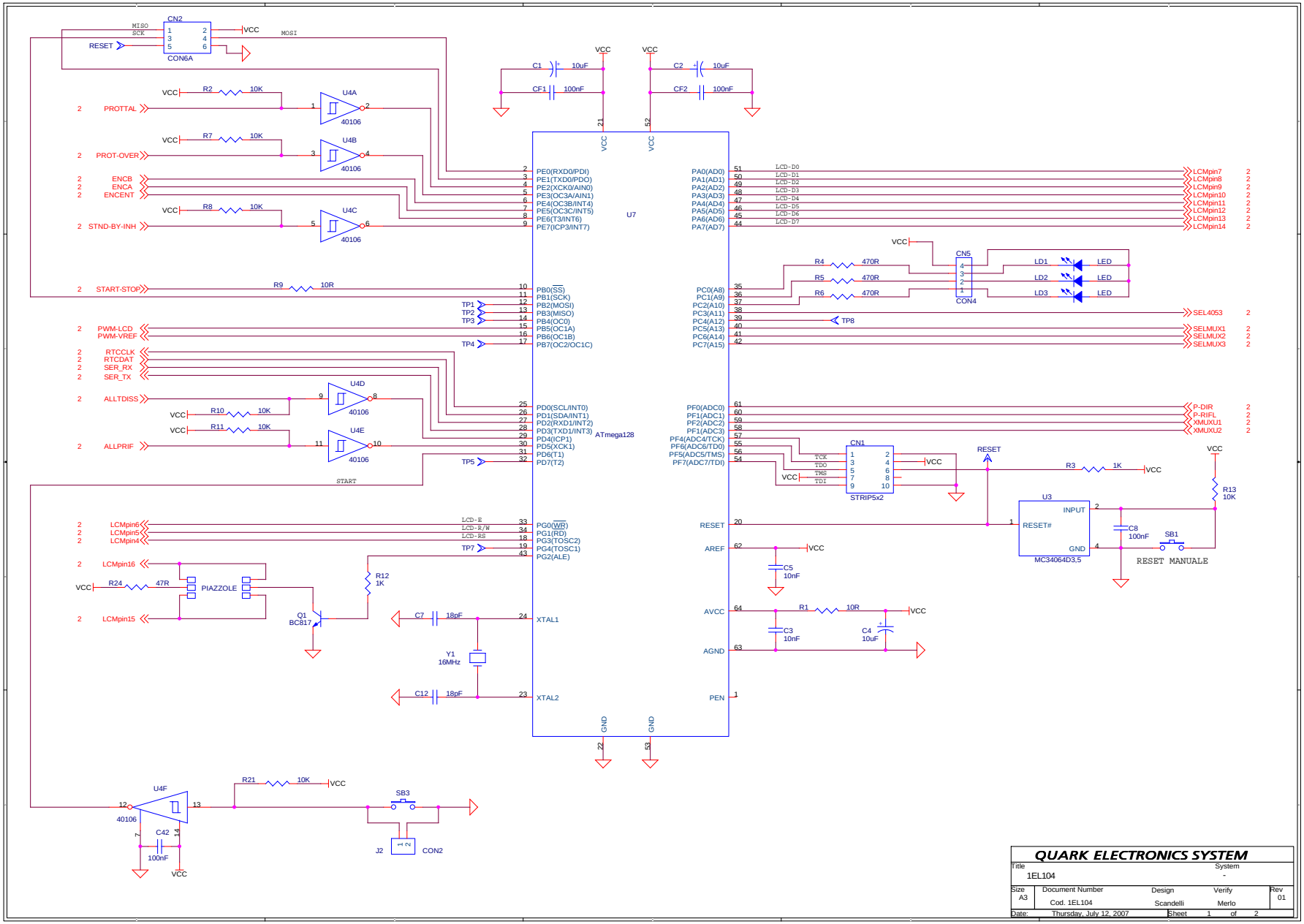


Figure 5 – Control board (1EL104) – Circuit diagram 2/2

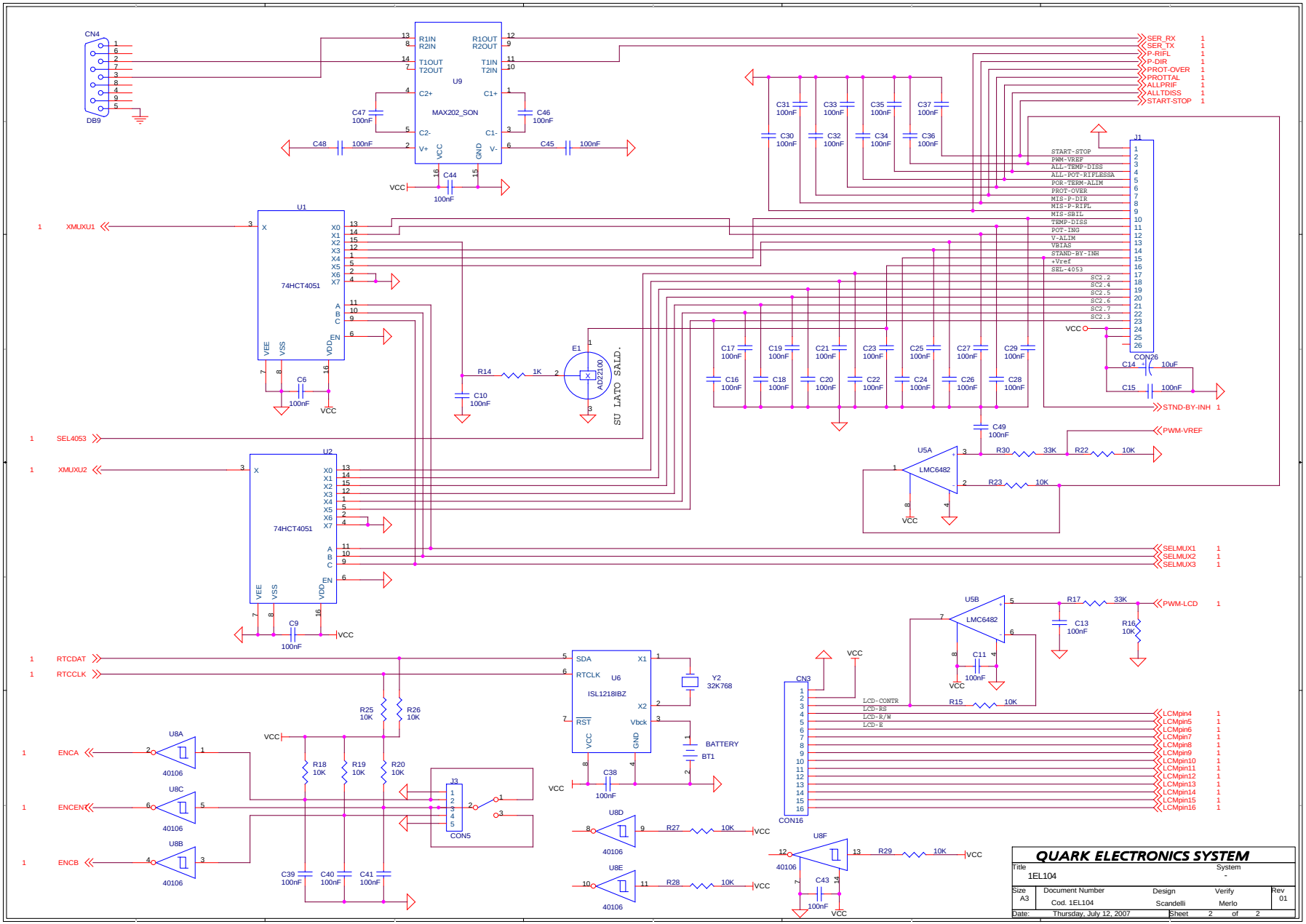


Figure 6 – Control board (1EL104) – Part layout

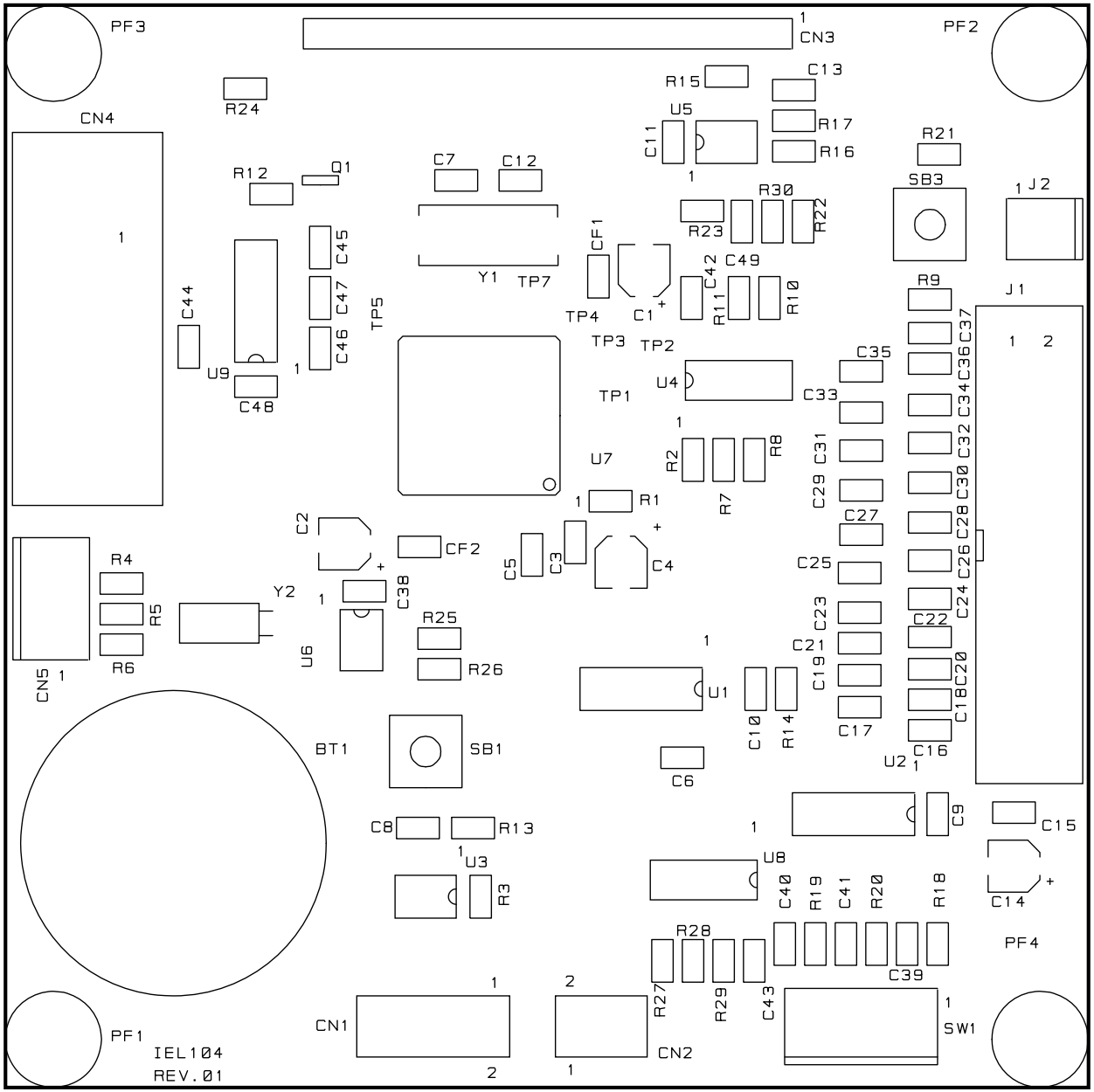


Figure 7 – Control board (1EL104) – Part list

Design		Verify	BOM EL104	REV.01
Scandelli		Merlo		
System				
-				
Bill Of Materials		May 29,2007 15:01:03		Page1
Item	Qty	Reference	Part	PKG

1	1	BT1	BATTERY	3 Ampere
2	42	CF1,CF2,C6,C8,C9,C10,C11,	100nF/50V/X7R	0805
		C13,C15,C16,C17,C18,C19,		
		C20,C21,C22,C23,C24,C25,		
		C26,C27,C28,C29,C30,C31,		
		C32,C33,C34,C35,C36,C37,		
		C38,C39,C40,C41,C42,C43,		
		C44,C45,C47,C46,C48,C49		
3	1	CN1	STRIP5x2	Passo 2,54
4	1	CN2	STRIP 3x2	Passo 2,54
5	1	CN3	STRIP 16x1	Passo 2,54 DISPLAY
6	1	CN4	DB9	CANON MASCHIO
7	1	CN5	MASCOM 4x1	Passo 2,54
8	4	C1,C2,C4,C14	10uF/16V/SMT-Elettr.	CASE-B
9	2	C3,C5	10nF/50V/X7R	0805
10	2	C12,C7	18pF	0805
11	1	E1	AD22100	T092
12	1	J1	CON13x2	Passo 2,54
13	1	J2	MASCOM 2x1	Passo 2,54
14	3	LD1,LD2,LD3	LED	VOLANTI
15	1	Q1	BC817	SOT23
16	2	R9,R1	10R	0805
17	19	R2,R7,R8,R10,R11,R13,R15,	10K	0805
		R16,R18,R19,R20,R21,R22,		
18		R23,R25,R26,R27,R28,R29		
19	3	R3,R12,R14	1K	0805
20	3	R4,R5,R6	470R	0805
21	2	R30,R17	33K	0805
22	1	R24	47R	0805
23	2	SB3,SB1	SW_PUSHBUTTON	chiedere dimensioni
25	1	SW1	MASCOM 5x1	Passo 2,54
26	2	U2,U1	74HCT4051	SOIC16
27	1	U3	MC34064D3,5	SO8
28	2	U4,U8	40106	SO14
29	1	U5	LMC6482	S08
30	1	U6	DS1672	SO8
31	1	U7	ATmega128	TQFP64 (14x14x1)
32	1	U9	MAX202_SON	SO16
33	1	Y1	16MHz	HC49 Ribassato
34	1	Y2	32K768	Cilindro PTH o SMT

Figure 8 – Logic board (1EL105) – Circuit diagram 1/2

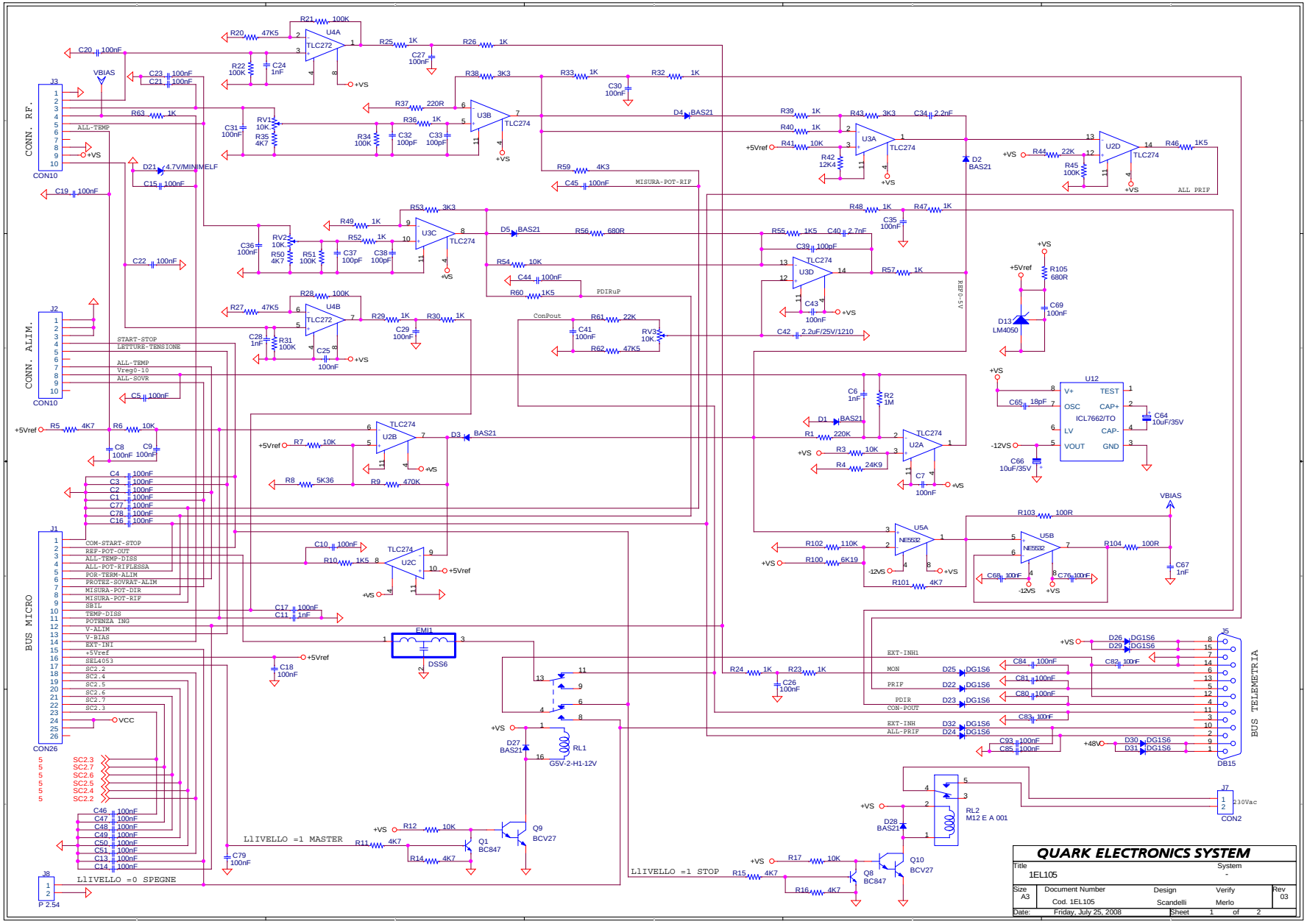


Figure 9 – Logic board (1EL105) – Circuit diagram 2/2

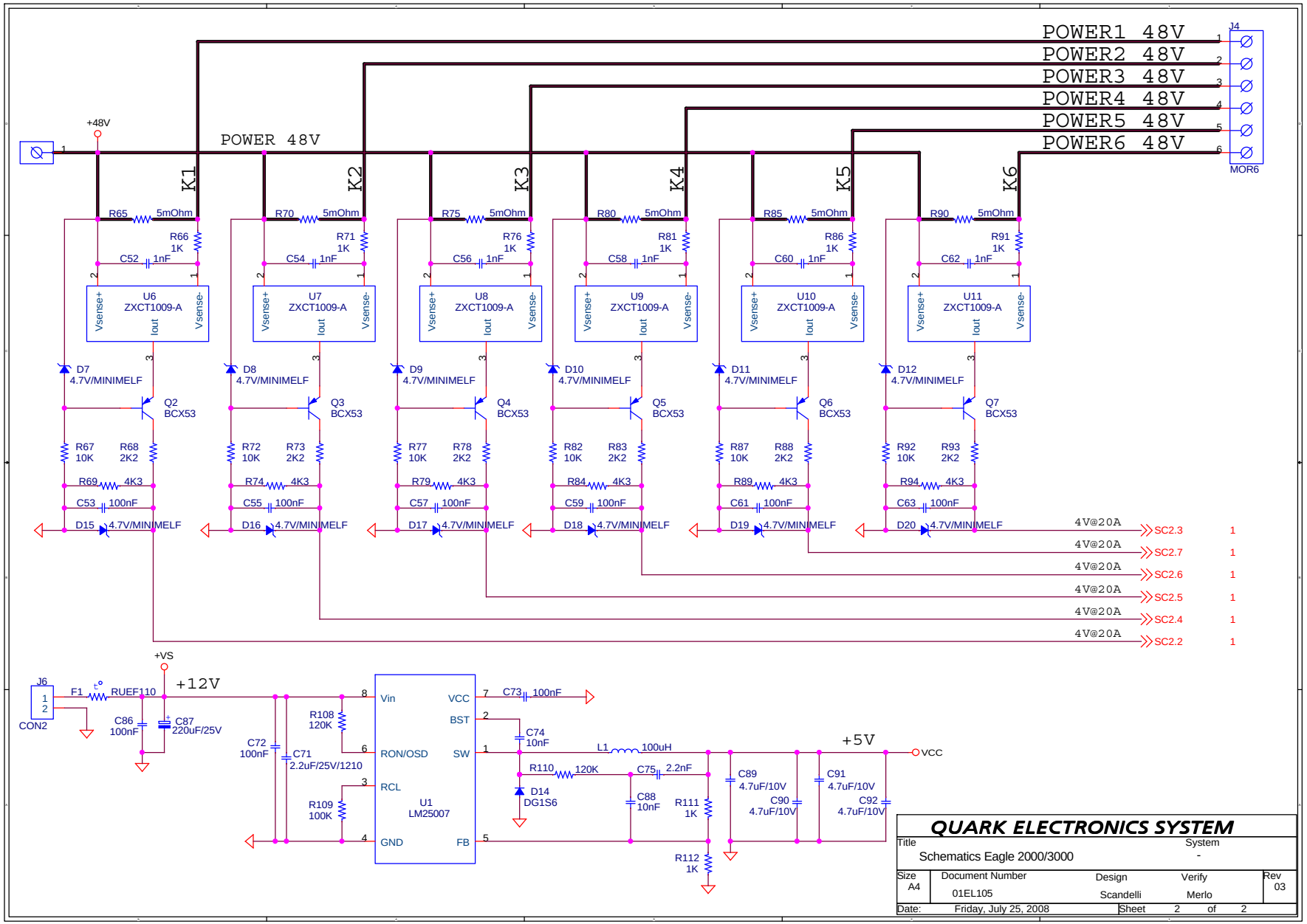


Figure 10 – Logic board (1EL105) – Part layout

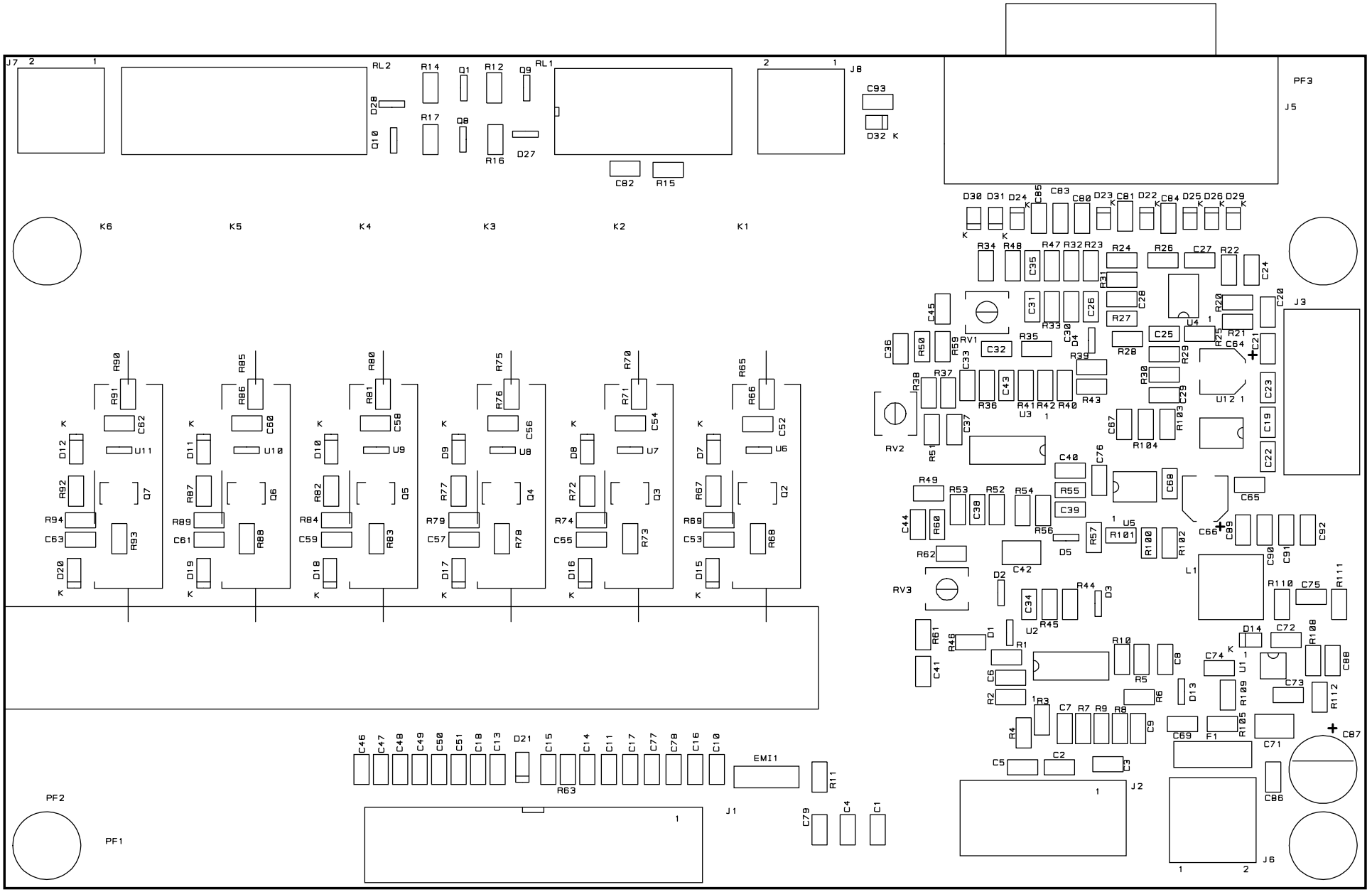


Figure 11 – Logic board (1EL105) – Part list 1/2

1EL105 Revised: Monday, June 16, 2008
Cod. 1EL105 Revision: 03

Design Verify
Scandelli Merlo
System
-

Bill Of Materials June 16,2008 16:54:08 Page1

Item	Qty	Reference	Part
1	60	C1,C2,C3,C4,C5,C7,C8,C9, C10,C13,C14,C15,C16,C17, C18,C19,C20,C21,C22,C23, C25,C26,C27,C29,C30,C31, C35,C36,C41,C43,C44,C45, C46,C47,C48,C49,C50,C51, C53,C55,C57,C59,C61,C63, C68,C69,C72,C73,C76,C77, C78,C79,C80,C81,C82,C83, C84,C85,C86,C93	100nF
2	11	C6,C11,C24,C28,C52,C54, C56,C58,C60,C62,C67	1nF
3	5	C32,C33,C37,C38,C39	100pF
4	2	C34,C75	2.2nF
5	1	C40	2.7nF
6	2	C42,C71	2.2uF/25V/1210
7	2	C66,C64	10uF/35V
8	1	C65	18pF
9	2	C88,C74	10nF
10	1	C87	220uF/25V
11	4	C89,C90,C91,C92	4.7uF/10V
12	7	D1,D2,D3,D4,D5,D27,D28	BAS21
13	13	D7,D8,D9,D10,D11,D12,D15, D16,D17,D18,D19,D20,D21	4.7V/MINIMELF
14	1	D13	LM4050
15	10	D14,D22,D23,D24,D25,D26, D29,D30,D31,D32	DG1S6
16	1	EMI1	DSS6
17	1	F1	RUEF110
18	1	JP1	CONNVITE1
19	1	J1	CON26
20	2	J3,J2	CON10
21	1	J4	MOR6
22	1	J5	DB15
23	2	J7,J6	CON2
24	1	J8	P 2.54
25	1	L1	100uH
26	2	Q1,Q8	BC847
27	6	Q2,Q3,Q4,Q5,Q6,Q7	BCX53
28	2	Q9,Q10	BCV27
29	1	RL1	G5V-2-H1-12V
30	1	RL2	M12 E A 001

Figure 12 – Logic board (1EL105) – Part list 2/2

31	3	RV1,RV2,RV3	10K.
32	1	R1	220K
33	1	R2	1M
34	13	R3,R6,R7,R12,R17,R41,R54, R67,R72,R77,R82,R87,R92	10K
35	1	R4	24K9
36	8	R5,R11,R14,R15,R16,R35, R50,R101	4K7
37	1	R8	5K36
38	1	R9	470K
39	4	R10,R46,R55,R60	1K5
40	3	R20,R27,R62	47K5
41	8	R21,R22,R28,R31,R34,R45, R51,R109	100K
42	25	R23,R24,R25,R26,R29,R30, R32,R33,R36,R39,R40,R47, R48,R49,R52,R57,R63,R66, R71,R76,R81,R86,R91,R111, R112	1K
43	1	R37	220R
44	3	R38,R43,R53	3K3
45	1	R42	12K4
46	2	R61,R44	22K
47	2	R105,R56	680R
48	7	R59,R69,R74,R79,R84,R89, R94	4K3
49	6	R65,R70,R75,R80,R85,R90	5mOhm
50	6	R68,R73,R78,R83,R88,R93	2K2
51	1	R100	6K19
52	1	R102	110K
53	2	R103,R104	100R
54	2	R110,R108	120K
55	2	TP232,TP234	VBIAS
56	1	U1	LM25007
57	2	U2,U3	TLC274
58	1	U4	TLC272
59	1	U5	NE5532
60	6	U6,U7,U8,U9,U10,U11	ZXCT1009-A
61	1	U12	ICL7662/TO

Figure 13 – LED board – Part layout

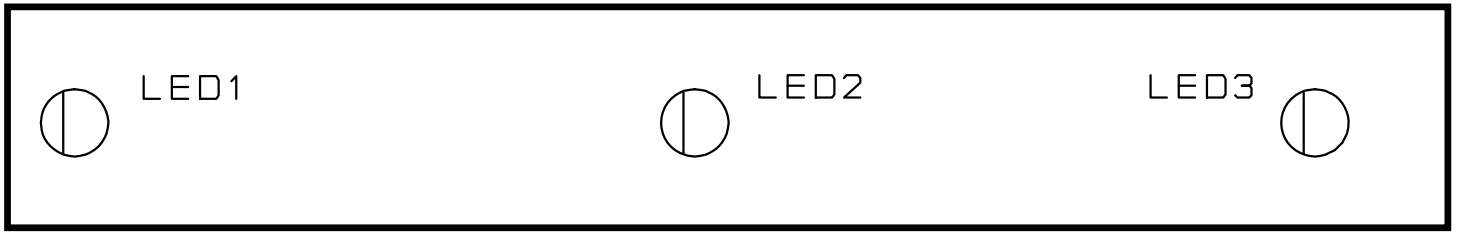


Figure 14 – Power Supply unit – Circuit diagram 1/7

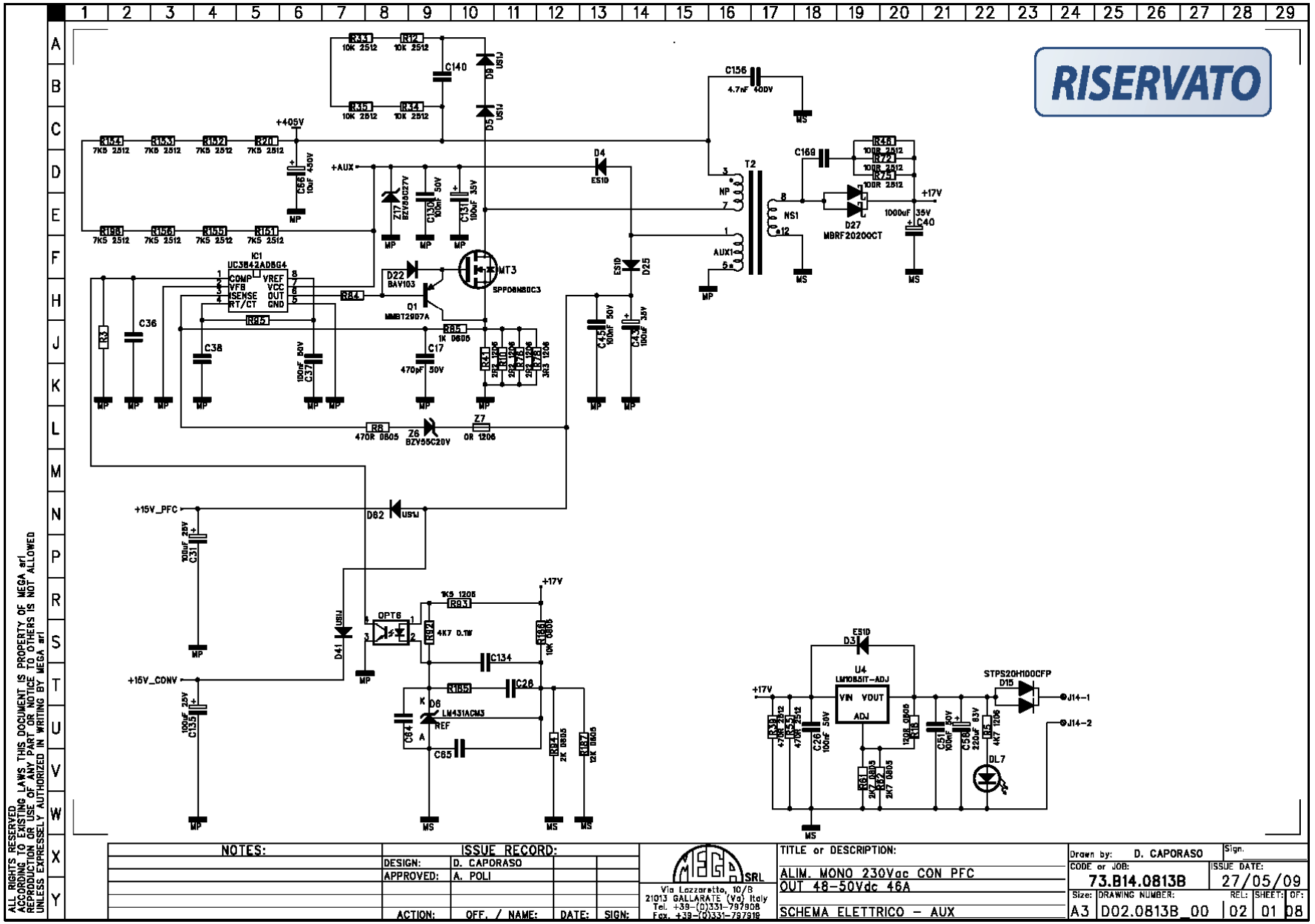
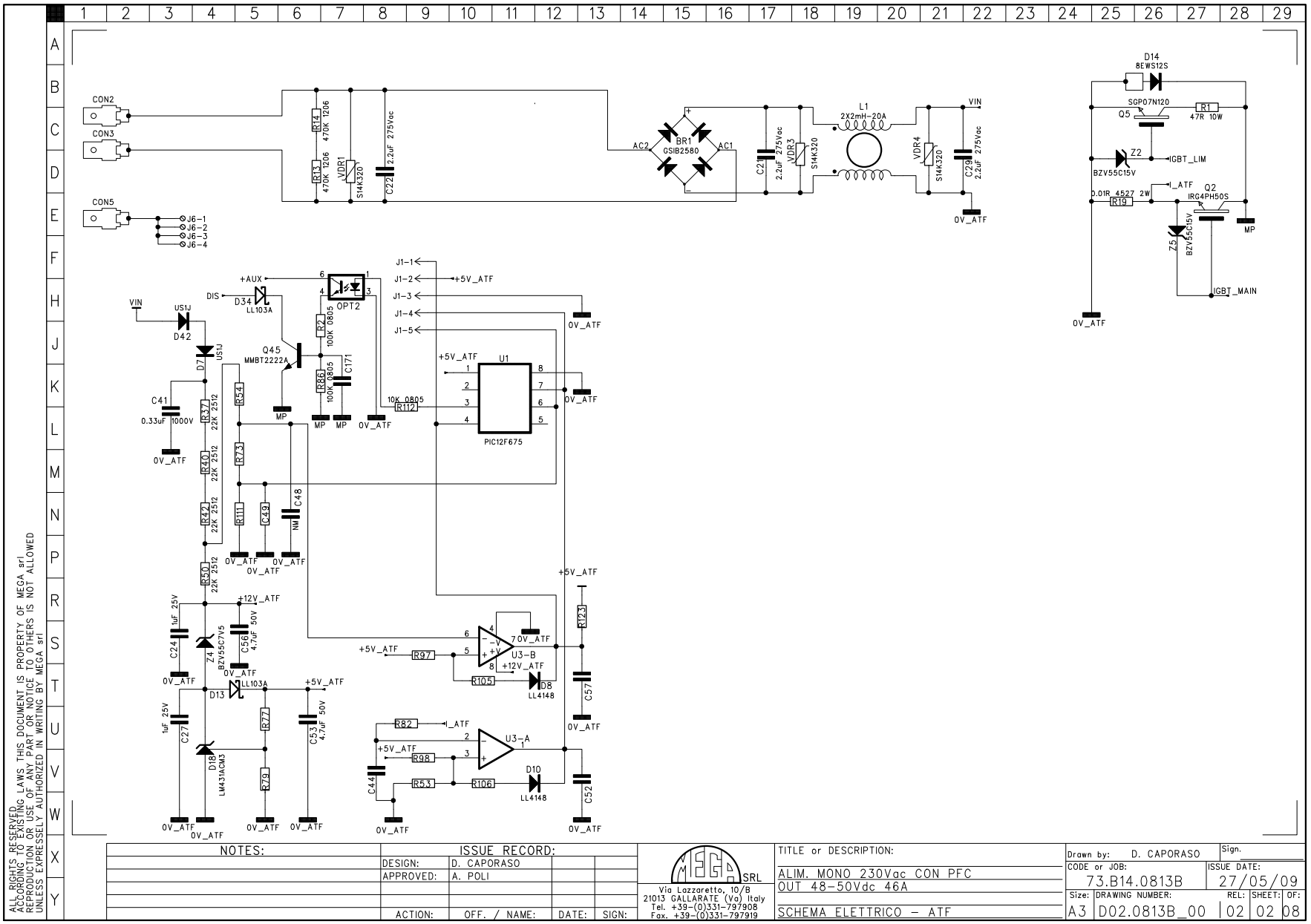


Figure 15 – Power Supply unit – Circuit diagram 2/7



NOTES:	ISSUE RECORD:			
	DESIGN:	D. CAPORASO		
	APPROVED:	A. POLI		
	ACTION:	OFF. / NAME:	DATE:	SIGN:

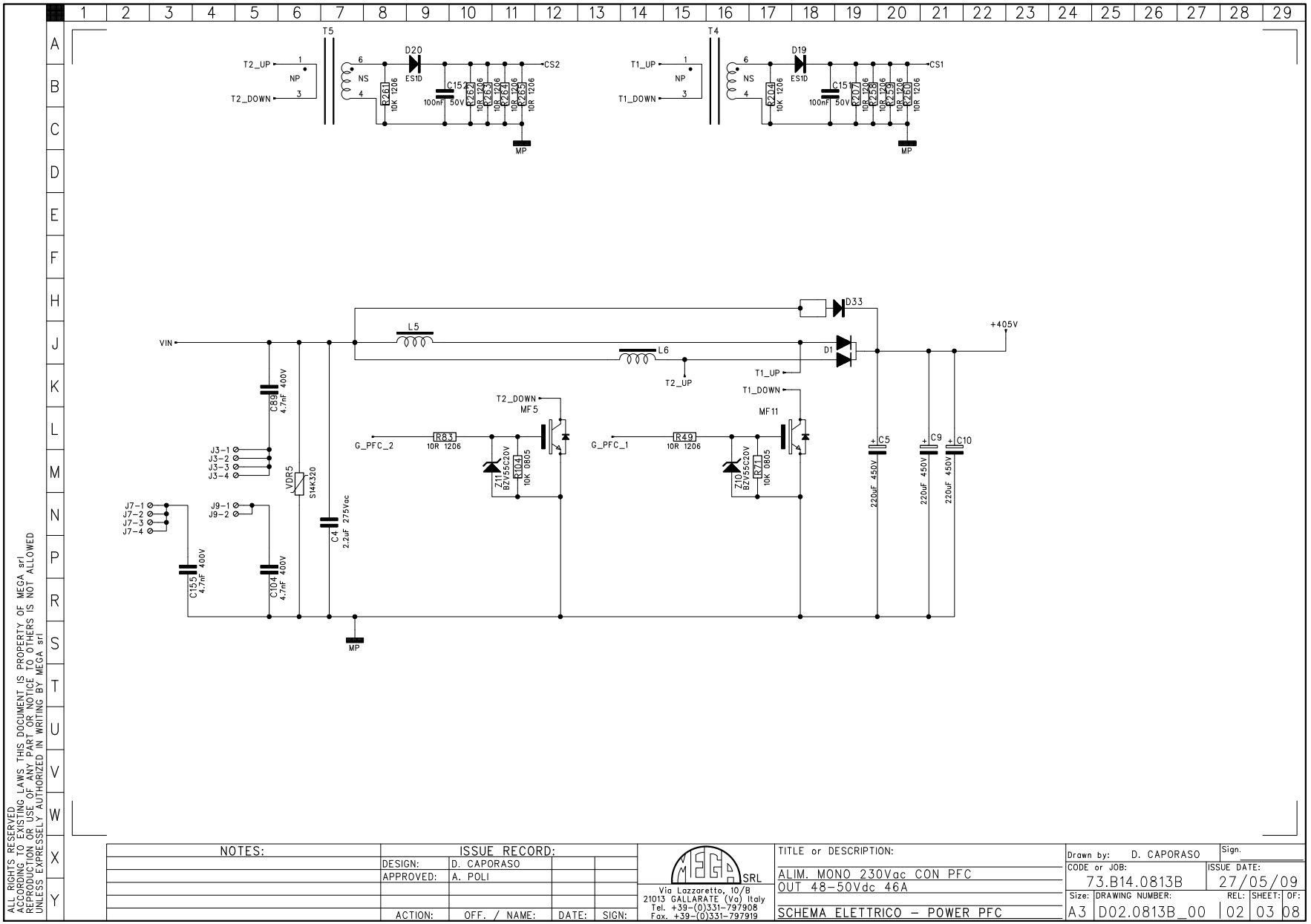
MEGA SRL
Via Lazzaretto, 10/B
21013 GALLARATE (Va) Italy
Tel. +39-(0)331-797908
Fax. +39-(0)331-797919

TITLE or DESCRIPTION:
ALIM. MONO 230Vac CON PFC
OUT 48-50Vdc 46A
SCHEMA ELETTRICO - ATF

Drawn by: D. CAPORASO | Sign.
CODE or JOB: 73.B14.0813B | ISSUE DATE: 27/05/09
Size: A3 | DRAWING NUMBER: D02.0813B_00 | REL: 02 | SHEET: 02 | OF: 08

ALL RIGHTS RESERVED
ACCORDING TO EXISTING LAWS, THIS DOCUMENT IS PROPERTY OF MEGA srl
REPRODUCTION OR USE OF ANY PART OR NOTICE TO OTHERS IS NOT ALLOWED
UNLESS EXPRESSELY AUTHORIZED IN WRITING BY MEGA srl

Figure 16 – Power Supply unit – Circuit diagram 3/7



ALL RIGHTS RESERVED
ACCORDING TO EXISTING LAWS, THIS DOCUMENT IS PROPERTY OF MEGA srl
REPRODUCTION OR USE OF ANY PART OR NOTICE TO OTHERS IS NOT ALLOWED
UNLESS EXPRESSELY AUTHORIZED IN WRITING BY MEGA srl

NOTES:	ISSUE RECORD:			
	DESIGN:	D. CAPORASO		
	APPROVED:	A. POLI		
	ACTION:	OFF. / NAME:	DATE:	SIGN:

MEGA SRL
Via Lazzaretto, 10/B
21013 GALLARATE (Va) Italy
Tel. +39-(0)331-797908
Fax. +39-(0)331-797919

TITLE or DESCRIPTION:	ALIM. MONO 230Vac CON PFC OUT 48-50Vdc 46A SCHEMA ELETTRICO – POWER PFC
Drawn by: D. CAPORASO	Sign.
CODE or JOB: 73.B14.0813B	ISSUE DATE: 27/05/09
Size: A3	DRAWING NUMBER: D02.0813B_00 / REL: 02 / SHEET: 03 / OF: 08

Figure 17 – Power Supply unit – Circuit diagram 4/7

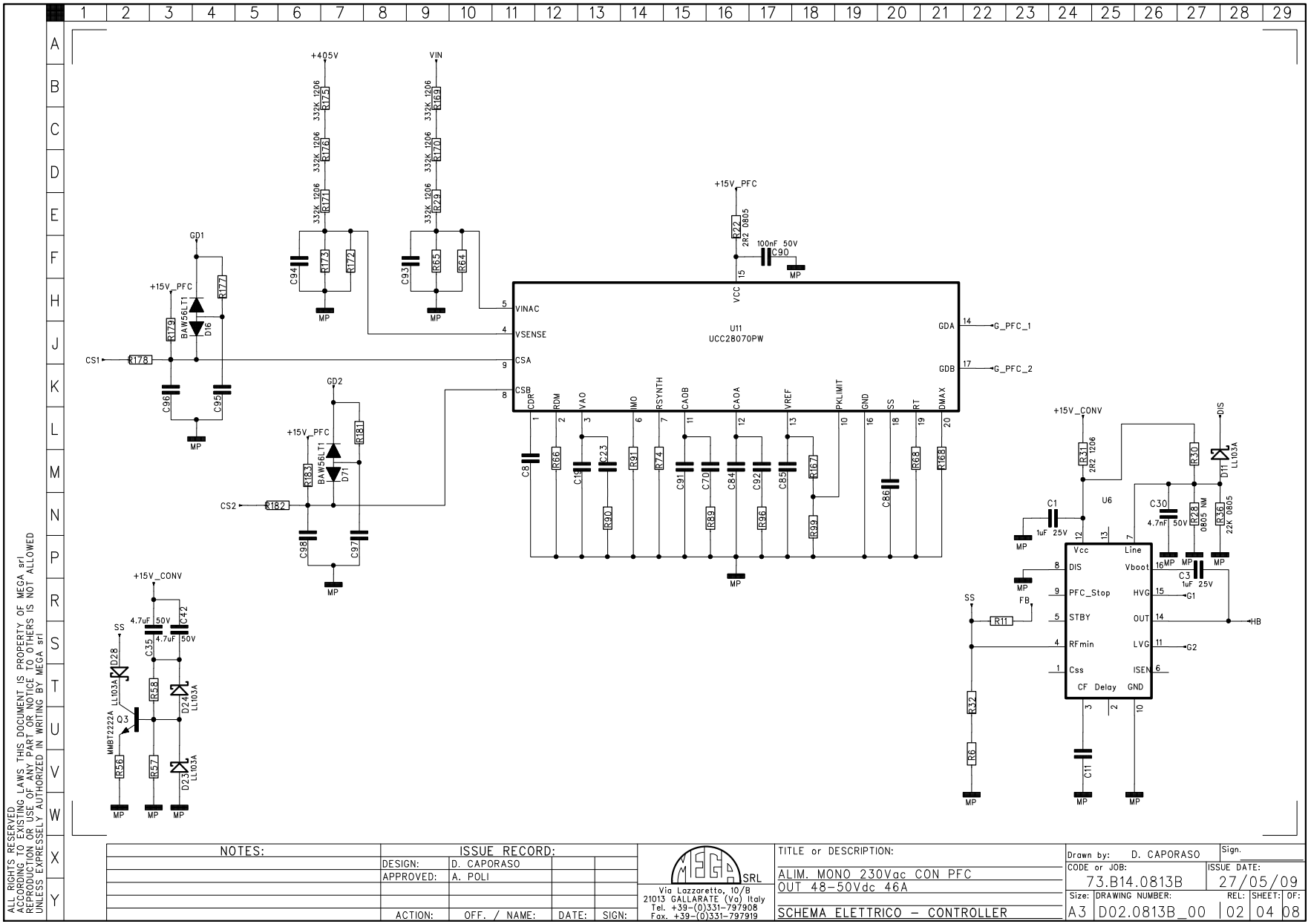
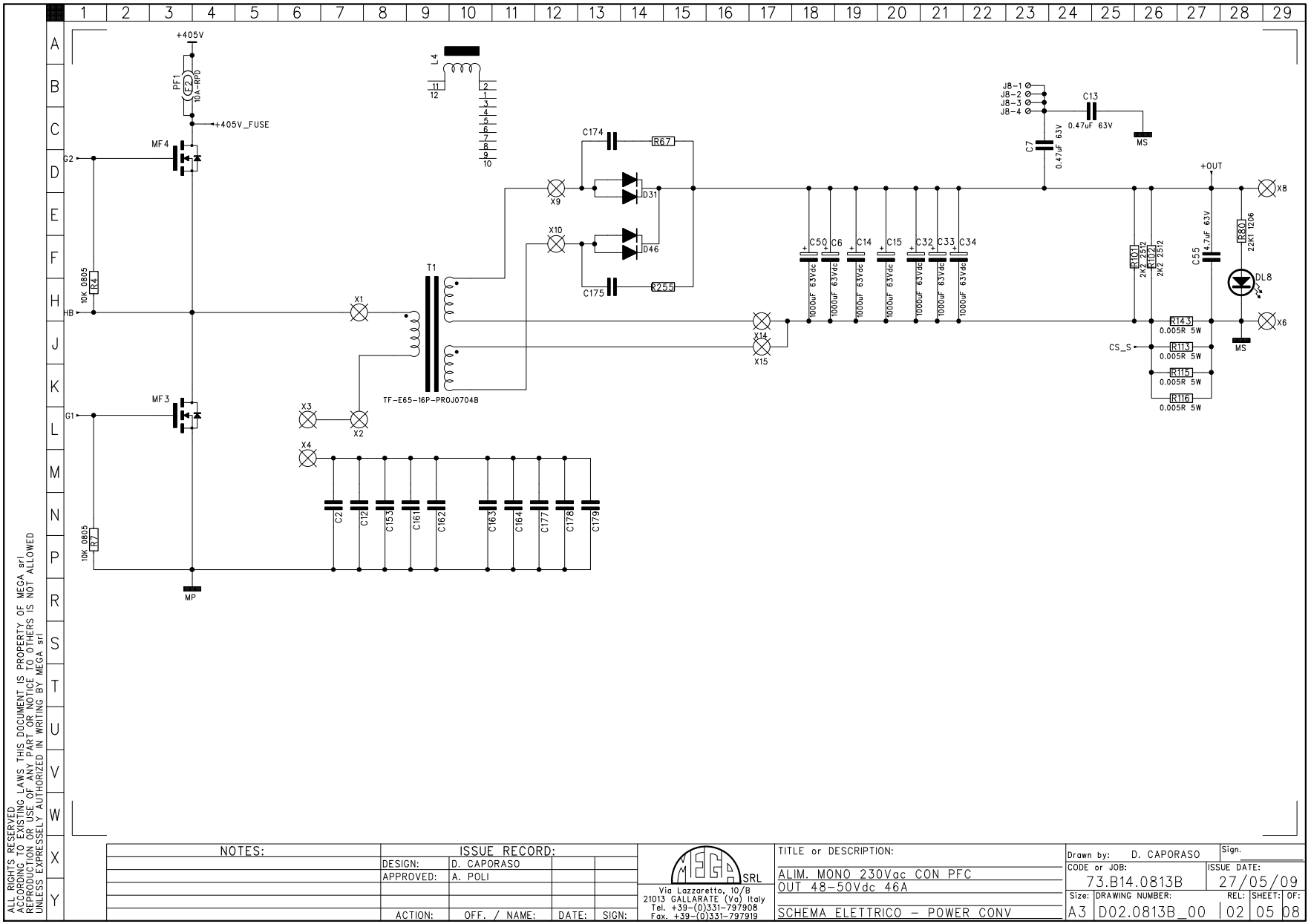


Figure 18 – Power Supply unit – Circuit diagram 5/7



ALL RIGHTS RESERVED
ACCORDING TO EXISTING LAWS, THIS DOCUMENT IS PROPERTY OF MEGA srl
REPRODUCTION OR USE OF ANY PART OR NOTICE TO OTHERS IS NOT ALLOWED
UNLESS EXPRESSELY AUTHORIZED IN WRITING BY MEGA srl

NOTES:	ISSUE RECORD:			
	DESIGN:	D. CAPORASO		
	APPROVED:	A. POLI		
	ACTION:	OFF. / NAME:	DATE:	SIGN:

MEGA SRL
Via Lazzaretto, 10/B
21013 GALLARATE (Va) Italy
Tel. +39-(0)331-797908
Fax. +39-(0)331-797919

TITLE or DESCRIPTION:
ALIM. MONO 230Vac CON PFC
OUT 48-50Vdc 46A
SCHEMA ELETTRICO – POWER CONV

Drawn by: D. CAPORASO	Sign.
CODE or JOB: 73.B14.0813B	ISSUE DATE: 27/05/09

Size:	DRAWING NUMBER:	REL:	SHEET:	OF:
A3	D02.0813B_00	02	05	08

Figure 19 – Power Supply unit – Circuit diagram 6/7

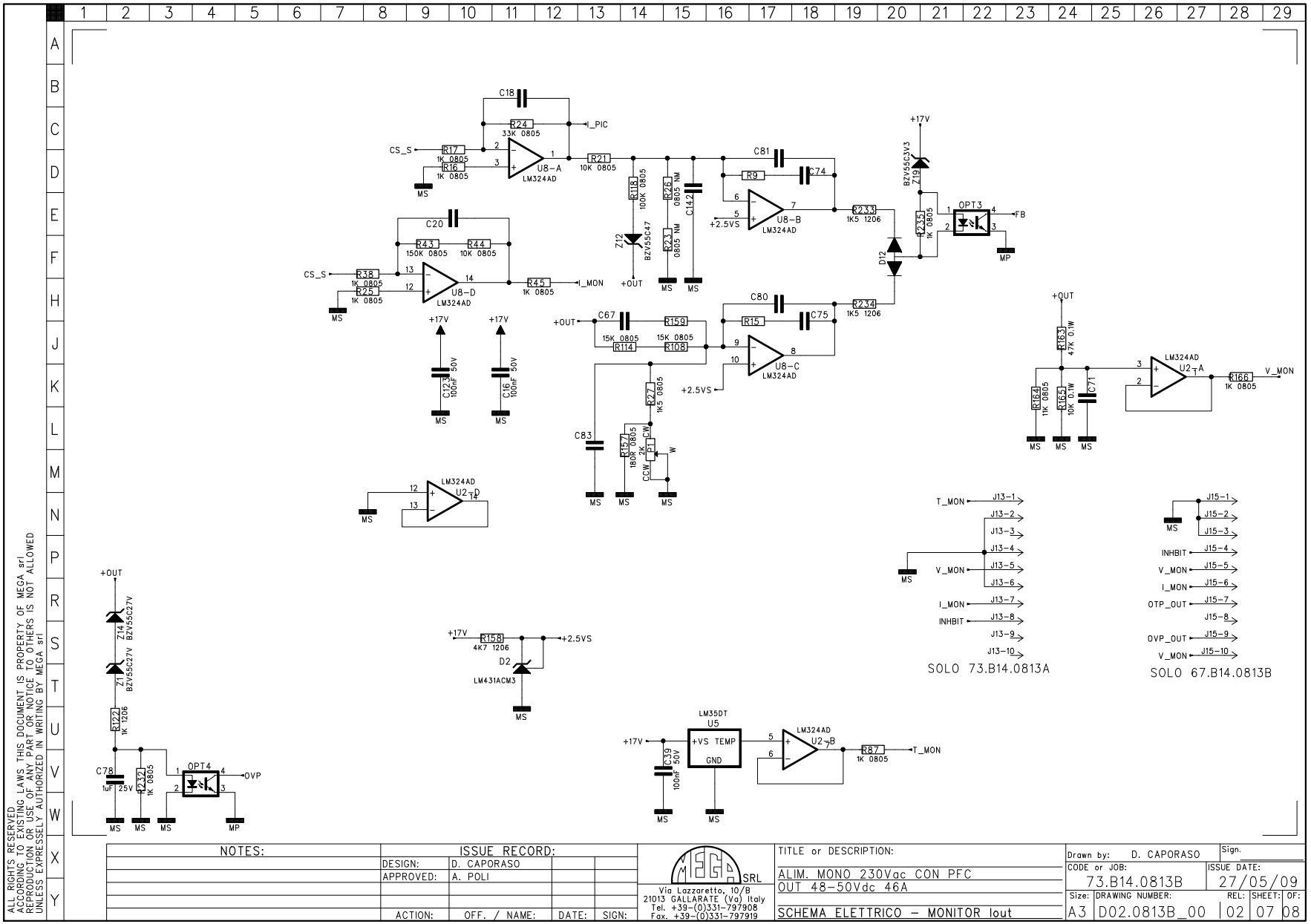
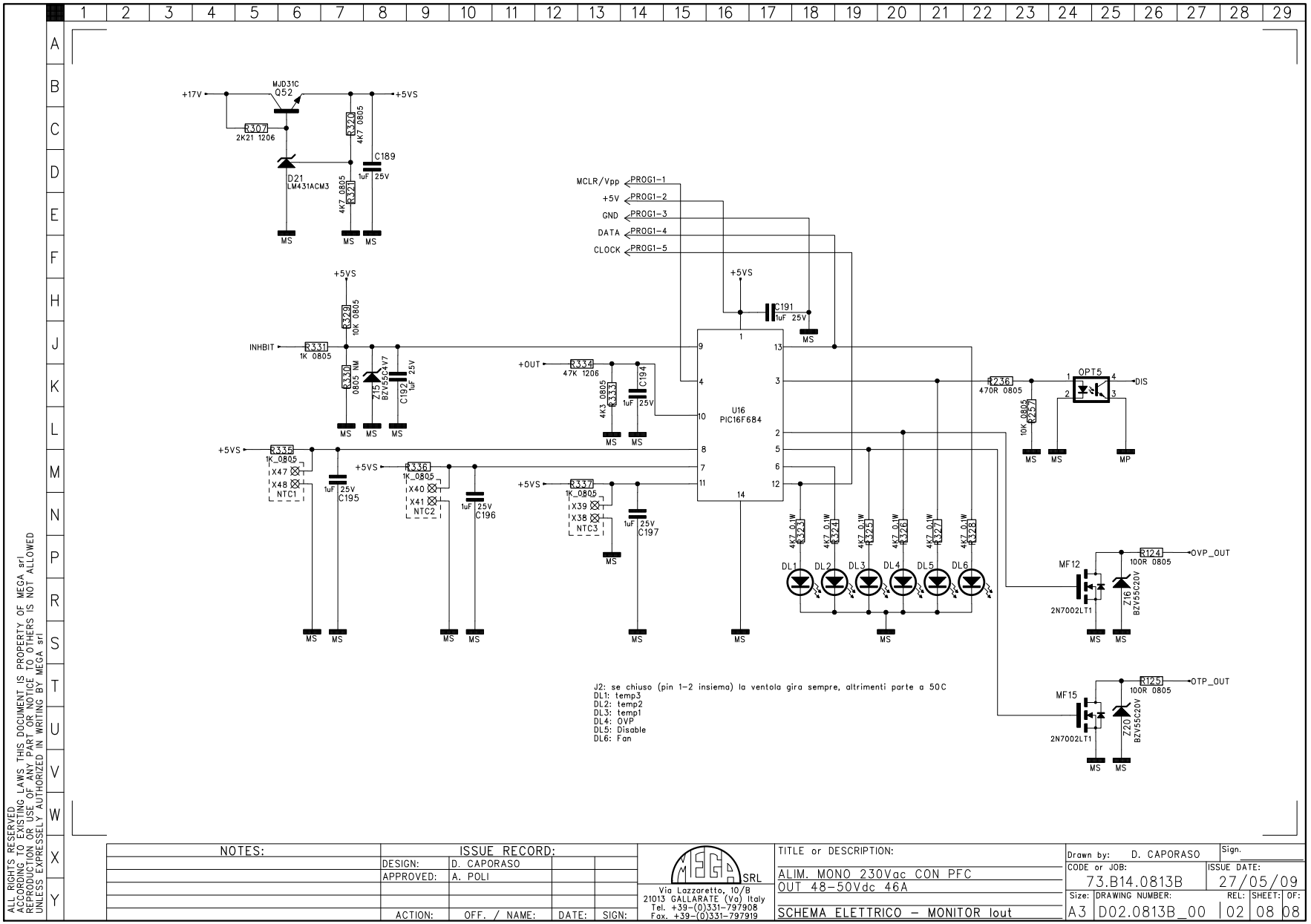


Figure 20 – Power Supply unit – Circuit diagram 7/7



ALL RIGHTS RESERVED
ACCORDING TO EXISTING LAWS, THIS DOCUMENT IS PROPERTY OF MEGA srl
REPRODUCTION OR USE OF ANY PART OR NOTICE TO OTHERS IS NOT ALLOWED
UNLESS EXPRESSELY AUTHORIZED IN WRITING BY MEGA srl

NOTES:	ISSUE RECORD:			
	DESIGN:	D. CAPORASO		
	APPROVED:	A. POLI		
	ACTION:	OFF. / NAME:	DATE:	SIGN:

MEGA SRL
Via Lazzaretto, 10/B
21013 GALLARATE (Va) Italy
Tel. +39-(0)331-797908
Fax. +39-(0)331-797919

TITLE or DESCRIPTION:	ALIM. MONO 230Vac CON PFC OUT 48-50Vdc 46A SCHEMA ELETTRICO – MONITOR Iout
Drawn by:	D. CAPORASO
Sign.	
CODE or JOB:	73.B14.0813B
ISSUE DATE:	27/05/09
Size:	A3
DRAWING NUMBER:	D02.0813B_00
REL:	02
SHEET:	08
OF:	08

16 DECLARATION OF CONFORMITY

Broadcast Quark di M. Merlo
Sede Legale:Via Bellincione, 26 - 20134 Milano – Italy
Sede Operativa:P.zza San Giovanni, 30-20080 Cisliano (Mi) Italy
Tel. + 39 02 45073447 – Fax - + 39 02 45070349
Partita Iva: 06000730967 – c.f. MRLMRC72B19F205V

www.quarkelectronics.it - E-mail : info@quarkelectronics.it

CE and R&TTE DECLARATION OF CONFORMITY

We, the undersigned: **Broadcast Quark di M. Merlo**
Via Bellincione, 26 - 20134 Milano – Italy
Tel. + 39 02 45073447 – Fax - + 39 02 45070349
www.quarkelectronics.it - E-mail : info@quarkelectronics.it

certify and declare under our sole responsibility that the following equipments:

Product description / intended use	FM Sound Broadcast Trasmitter
Commercial name	Eagle 20.000, Eagle 15.000, Eagle 12.000, Eagle 10.000, Eagle 5.000, Eagle 4.000, Eagle 3.000, Eagle 2.500, Eagle 2.000 Eagle 1.000, Eagle 500
Brand	Broadcast Quark di M. Merlo

Are tested to and conform with the essential requirements for the protection of health and the safety of the and user and any other person and Electomagnetic Campatibility, as includec in the following standards:

Standard reference	**Test report by:** PRIMA RICERCA & SVILUPPO
EN 302 018-2 V1.2.1	EN 302 018-1 V1.2.1
EN 301 489-11 V1.3.1	EN 301 489-1 V1.7.1

And are tested to and conform with the essential radio test suites so that they effectively use the frequency spectrum allocated to terrestrial/space radio communication so to as to avoid harmful interference, as included in the following standards:

Standard reference	**Test report by:** PRIMA RICERCA & SVILUPPO
EN 302 018-2 V1.2.1	EN 302 018-1 V1.2.1
EN 301 489-11 V1.3.1	EN 301 489-1 V1.7.1

And therofor compliers with the essential requirements and provisions of the Directive 1995/5/EC of the European Parliament and of the Courcil of March 9, 1999 on Radio Equipments and Telecommunications terminal Equipment and the mutual recognition of their conformity and with the provisions of Annex IV(Coformity Assessment procedure,to in Art. 10).
The technical documentation as requested by the Conformity Assessment Procedure is available in the following addresses:

- **Broadcast Quark**
- **Prima Ricerca & Sviluppo** Via Campagna, 92- 22020 Faloppio -Como -Italia

Merlo Marco (director)